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VOL. I.—16TH YEAR. SYDNEY, SATURDAY, MARCH 2, 1929. No. 9.

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ACUTE OSTEO-MYELITIS IN CHILDREN.[1]

By R. B. WADE, M.D. (Sydney), F.C.S.A.,
Honorary Surgeon, Royal Alexandra Hospital for Children, Sydney.

ACUTE hæmatogenous osteo-myelitis is an infection of the blood stream, of which the inflammation in the bone is the local manifestation.

Lannelonge,[(1)] in 1879, was the first to give a clear description of this affection and to point out that the initial focus was always situated in the juxta-epiphyseal region of the bone.

In 1880 Pasteur[(2)] demonstrated that the causal organism of osteo-myelitis is identical with that of a boil, namely the *Staphylococcus aureus.*

Osteo-myelitis is, then, the inflammation of the medulla of bone and one can consider this marrow as occupying the central canal of the diaphysis, the yellow marrow and also the spongy tissue at the ends of the bone, the active red marrow, and it must also be remembered that the deep layer of the periosteum forms portion of this marrow and communicates with the other through the canals of the Haversian system.

I shall refer briefly to the constitution of bone. The diaphysis, the epiphysis, the epiphyseal cartilage, the periosteum, endosteum and marrow are the component parts. It will be noted that the superficial layer of the periosteum merges with the capsule of the joint, while the deep layer is attached firmly just below the epiphyseal cartilage.

The two most important points in the anatomy as regards osteo-myelitis are that portion of the bone called the metaphysis, namely the juxta-epiphyseal portion of the diaphysis that is composed of the recently formed new bone, and the osteo-genetic layer of the periosteum which is joined to the margin of the epiphyseal plate.

Lexer, working from stereoscopic skiagrams of bone in which the vessels had been injected with a solution of mercury and oil of turpentine, gives the following as the blood supply. He states there are three distinct systems of blood vessels which supply the juxta-epiphyseal cancellous tissue, namely the end arteries of periosteal, nutrient and capsular branches. It is stated that the capillaries in the metaphysis are distributed in tortuous loops which lead to the slowing of the blood current and so to the deposition of embolic bodies.

Fraser[(3)] writes:

> The typical method of supply, as seen in any of the long bones of the body, may be described as follows. The nutrient vessel bearing the main blood supply enters the shaft of the bone about the middle. The orientation of the vessel at its entrance is found to be wonderfully constant and there are some who claim that the direction is an important factor in the subsequent localization of inflammatory disease. From the knee and towards the elbow is the scheme of distribution.
>
> Having entered the bone, the vessel breaks up into two divisions which are respectively directed towards the opposite extremities of the bone. At first the groups are arranged as a leash of vessels, but as the bone extremity is reached, they subdivide into a complex anastomosis of thin-walled spaces.
>
> A second series of vessels passes into the bone from the neighbouring joint. At the extremities of each joint there is a vascular ring located in the peri-synovial tissues (the *circus vasculosus*) and from this vessels pass into the interior of the bone to open either in the epiphysis or in the metaphysis. If the vessels from the joint anastomosis pass into the metaphysis, they are spoken of as juxta-epiphyseal or Lexer's arteries; they form the distribution which occurs when the ligaments and the synovial reflection of the related joint extend so as to include within their attachments the epiphysis, the epiphyseal cartilage and the metaphysis. The practical bearing is alluded to more fully later, but it can be appreciated now that, owing to the liability of infection occurring in the metaphysis, the existence of the juxta-epiphyseal arteries increases the chance of a bone infection being followed by a joint infection and *vice versa.* If it happens that the joint connexion does not extend beyond the epiphysis, the vessels entering the bone are termed epiphyseal vessels; their connexion with the metaphysis is only secondary after extending through the epiphysis and the epiphyseal cartilage and an arrangement on this basis is less likely to be associated with secondary infection of the joint by the bone or *vice versa.*
>
> The scheme of the blood supply of the bones is completed by the subperiosteal distribution.
>
> There are thus four sources of blood supply, nutrient, juxta-epiphyseal, epiphyseal and periosteal, and of these the three first mentioned ultimately anastomose in the metaphysis. The metaphysis is thus a large catchment area in the distribution of the blood and it would be difficult to exaggerate its practical importance.

The organisms concerned are stated to be in the following order of frequency: *Staphylococcus aureus,* pneumococcus, streptococcus, *Staphylococcus albus.* Of these the *Staphylococcus aureus* is by far the most virulent infecting agent.

The sources of infection may be in the new born the umbilicus, in older children pustular cutaneous sores, tonsils or elsewhere, but, as a rule, one cannot trace the sources of infection nor in the case of cutaneous impetiginous sores can one be sure from which the infection of the blood stream originated. Males are more frequently affected.

Various theories are given as to the methods of causation. It is stated that owing to the blood supply of the metaphysis being in end arteries in tortuous loops, embolism is more likely to occur there than elsewhere. The interesting point in this connexion is the statement made by Bancroft,[(4)] with which he gives a diagram after Lexer, and points out an area of relatively avascular bone just below the diaphysis where infection is most likely to occur.

Then again trauma is cited as a cause and in favour of this is the greater incidence in boys, but, though a history of injury can almost always be obtained, as indeed if asked for can be done in any period of a boy's life, the osteo-myelitis does not occur at the site of the injury or below the site of superficial bruising. Lawford Knaggs[(5)] ascribes the trauma to the fact that the newest and weakest bone is just deposited in the metaphysis and that, since the joint is held by strong ligaments, any

[1] Read at a meeting of the New South Wales Branch of the British Medical Association together with the Section of Orthopædics and the Section of Pædiatrics on October 25, 1928.

undue strain that is applied to it, must cause the metaphysis to suffer. He quotes cases of separation of the epiphysis. My own experience is that separation of an epiphysis is one of the rarest events seen in bone trauma.

Frequency.

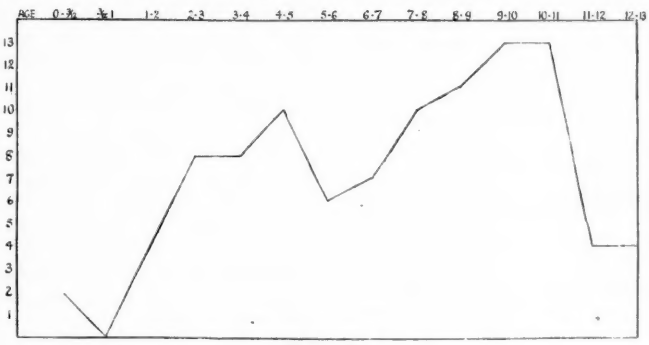
It is a disease more common among the poor and is not one of very great frequency. In the last ten years the number of the cases at the Royal Alexandra Hospital for Children was 613.

Sex.

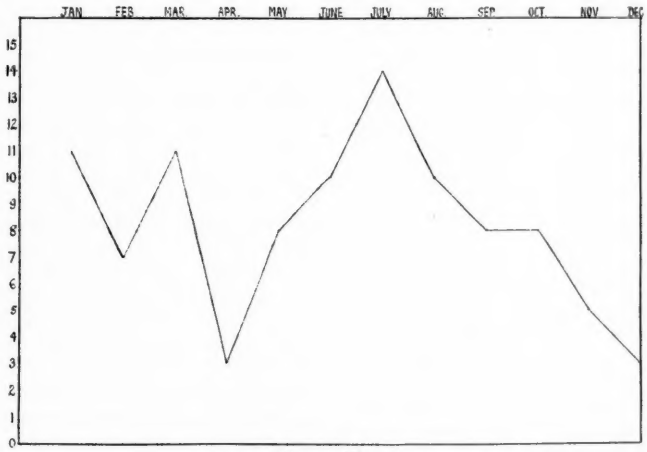
An analysis has been made of 100 consecutive cases admitted to the Royal Alexandra Hospital for Children. The sexes were thirty-six females, sixty-four males.

Age Incidence.

Graph I reveals the fact that there are cases occurring in the first three months of life, but practically none after that age until the age of two to three years and that the highest percentage is from nine to eleven. The fall in the curve from eleven to thirteen is not a true indication of the incidence of a disease. In reality, the incidence is highest from ten to fifteen and the fall is accounted for by the fact that the entrance age for children into the Royal Alexandra Hospital for Children was thirteen.



GRAPH I.



GRAPH II.

Seasonal Incidence.

Graph II was taken as I have been under the impression that a greater number of cases occurs during the latter half of the year.

I find that Ombrédanne[6] considers that the cases are more frequent in the months of spring. This graph does not give any very distinct indication, the highest amount being reached in July and August.

Situation of the Bony Lesion.

The bones were affected in the following order of frequency: Tibia (46), femur (39), fibula (15), humerus (10), ulna (7), *os calcis* (5), mandible (4), clavicle (3), ilium (3), radius (3), metatarsal bones (2), phalanx (2), astragalus (1), scaphoid (1).

In twenty-nine of the children there was more than one bone affected. One bone affected, 71; two bones affected, 18; three bones affected, 7; four bones affected, 3; five bones affected 1.

The only other parts infected were endocardium, pericardium and joints.

Mortality.

The case mortality was 15%. The following were the causes of death: Septicæmia (8), pyæmia (2), endocarditis (1), pericarditis (3), nephritis and pneumonia (1). The patient who died of nephritis and pneumonia, survived for three months.

The condition, therefore, is a local infection of the bone occurring in the course of a blood infection with some organism which probably has a specific selective action.

Rosenow[7] considers that in the case of streptococci individual strains are capable of reproducing their own particular diseases. This elective localization of the organism is shown by what are sometimes called the metastases, but which are in reality only separate localizations from the blood stream from the primary focus.

The affection starts in the metaphysis, usually near the periosteum. In the milder cases, when pus is formed, it travels under the periosteum, raises it to a certain extent, perforates it and comes to the surface.

In the more severe cases it may spread more rapidly through the red marrow into the medullary canal, perhaps to the red marrow on the other end and destroy the endosteum; pus finally exudes and separates the periosteum from the whole of the shaft. When the capsule of the joint overlaps the metaphysis, the joint may be thus directly infected. It may be infected by lymphatics connecting the bone with the capsule or by direct extension through the epiphyseal plate and epiphysis. One may have all grades in the degree of spread. The red marrow alone at one end may be finally involved with

recovery elsewhere except in small areas at one or both ends.

The discharge of pus through the Haversian spaces and the stripping of the periosteum would seem to determine in great measure the amount of sequestration. As a rule, owing to the tension of the products of inflammation confined in a rigid bony cage, there is death of much of the trabecular system, but in the main it is regenerated.

Sequestration.

Occasionally small sequestra are found in the deeper parts of the bone, but usually one will find the sequestrum composed entirely of dense cortical bone, due partly to the fact that it is more difficult to absorb and partly to the fact that it derives its blood supply from the periosteum, from which it is now separated.

In the rare cases when no sequestration of the superficial layer occurs, but a small sequestrum is shut off in the centre of the bone, we find the condition which leads later to the formation of a Brodie's abscess. Sequestration of the whole circumference of the diaphysis or portion of it will be found in the severer cases where the spread has been through the extent of the bone with destruction of the endosteum and elevation of the periosteum, when the contained pus exudes and strips it up.

Starr,[8] however, as a result of examination of bones in children dying of a septicæmia within two or three days of the onset of the infection and also of experimental work in rabbits, gives a different description of the spread of the infection. He states that the first point of inflammation is in the bone most recently laid down and presumably the least resistant bone cells lie along the epiphyseal line; it then extends along these newly formed cells of the cortex which, being also in the process of formation and therefore of extreme thinness, will be easily penetrated and the infection appear subperiosteally. The pus will spread along this, up the shaft away from the joint and along the cortical and subperiosteal tissues; he states further that in none of these early cases is there any inflammatory change in the upper central cancellous tissues in the neighbourhood of the medullary canal. In the later stages, when pus has extensively stripped the periosteum, it is commonly found that the inflammation backs up through the Haversian canals and may slowly invade the medulla, but it is usually found in isolated areas along the shaft of long bones with areas of uninfected tissues between.

My own personal experience is in distinct opposition to Starr's findings, for the whole shaft may be involved, even though early drainage has prevented the periosteum from being stripped from the bone at any point.

I need only mention the later phases of the formation of the involucrum, separation of the sequestrum and the drainage through the cloacal openings.

Osteo-myelitis is after all an infection of soft tissue and only differs from an infection of any of the soft tissues in that it occurs within a casing of bone through which drainage is perhaps more difficult than in the soft tissues and the increased tension within this bony case may lead to greater destruction of the contained constituents and thus to the death of the trabecular elements.

Like infections of the soft tissues it is all a question of the seed and the soil and one may get all grades of infection, from the very slightest with a bead of pus under the periosteum to severe infections with death from toxæmia or septicæmia and locally from the tiniest sequestrum to the necrosis of the whole shaft of the bone. Consequently a symptomatology that would cover all cases is impossible. There are the cases in which there is an acute infective condition, one bone affected and death within forty-eight hours from septicæmia. Next in order—they are the most severe cases with which we have to deal—are those with severe toxæmia, infection of a neighbouring joint and early secondary deposits in other bones or joints. These patients may die of toxæmia or septicæmia. Then there is the case with toxæmia of a moderately severe grade; there may or may not be metastatic deposits and in this recovery generally occurs. Finally there is the very mild case in which the condition is seldom recognized until the pus has stripped up a certain amount of the periosteum and perhaps perforated it as well.

The onset is always extremely sudden, that is there is a sudden intense pain felt in the affected bone; very often the older children can date exactly the time of onset. It is interesting to note that in many patients a prodromal stage may be noted, perhaps extending over four or five days, in which there are evanescent pains, complaint being usually of the joints; this is perhaps one of the reasons why the mistaken diagnosis of rheumatism is so often made. When the actual infection of the bone occurs, the pain is sudden and extreme and is spoken of as the "finger tip tenderness" in that one can localize exactly the site of pain by the pressure of a finger tip over one point of the diaphysis. This pain can often be elicited in the same way by applying pressure at right angles to the long axis of the bone when excruciating pain is caused. The pain on touching the affected limb is so acute that the child will generally shriek in anticipation, if any attempt is made to handle him.

Infants.

In infants in the first three months of life the condition is somewhat different; the infection probably comes from the umbilicus as a rule and the more common infecting organisms are the streptococcus and pneumococcus.

Though one may get a frank osteo-myelitis in which the shaft of the bone becomes affected, the more common manifestation of the condition is seen in the appearance of a suppurative arthritis. It may be that the infection in these cases is a true epiphysitis.

The outlook in these cases is as a rule good. They very seldom go on to sequestration and with the exception of the hip joint the prognosis is

usually good as regards recovery with movement. If the amount of cartilage affected in the epiphysis is great, there will probably be enough destruction to cause ankylosis, but, if small, as is usually the case, recovery with fair movement may be expected. When the hip joint is involved, it is usually the neck of the femur that is affected and ankylosis of that joint is extremely common.

Another interesting form of this epiphyseal osteomyelitis affecting the hip joint in infants is the condition associated with spontaneous dislocation of the hip, secondary to the softening and destruction of the capsular ligaments from the arthritis.

X rays are of no use at all in the early diagnosis and it is not until about the fourteenth day that the rays will pick up the first change which is in the nature of thinning and absorption in the affected area, with perhaps subperiosteal thickening.

Peculiarities of Individual Bones.

Certain of the bones have their own individual peculiarities. Infection of the neck of the femur is always associated with arthritis of the hip and ultimate ankylosis; infection of the upper end of the shaft of the femur is generally found with intense swelling of the thigh, massive abscess formation separating groups of muscles and when the collection of pus is opened, it is found to lead only to a small area of denuded bone in the shaft, perhaps not larger than a threepenny bit. When the lower metaphysis is attacked, infection of the knee joint is not uncommon, the pus always tends to travel to the posterior part of the bone in the popliteal space and it is from there that the periosteum is denuded and the cortical squestrum appears. In the upper end of the tibia, except in the very acute infections when there is lymphatic spread to it, the knee joint is seldom affected, whereas if the lower metaphysis is attacked, the infection of the ankle joint is common. In the pelvis when the ilium is affected, the subperiosteal effusion is usually on the inner surface of the bone and the mortality rate is high.

In osteo-myelitis of any of the tarsal bones the neighbouring joints are usually affected, particularly the ankle joint, when the astragalus is affected. In the humerus the lower metaphysis is liable to cause affection of the elbow joint and the sequestrum will be on the posterior surface.

Diagnosis.

The most common error made in the diagnosis of this condition is to mistake it in the early stage for acute rheumatism. This error is quite easily understood as in many cases a prodromal stage with fleeting pains attributed to the joints is found and when acute inflammation in the neighbourhood of the joint finally makes its appearance, it is thought to be a continuation of the same condition. The diagnosis, however, can be made between this and rheumatic affections by extreme acuteness of the condition, the swelling over the end of a bone near a joint and the extreme tenderness of the end of the shaft of the bone on pressure.

Prognosis.

The prognosis will, of course, depend on the virulence of the infection and the resistance of the individual. As in any other affection the appearance of pus is an indication that the tissue is successfully resisting the attack. A favourable prognosis can be given only when the opening into the bone is exuding pus and when the secondary infections show an early purulent reaction. It should be noted that many of the secondary bone infections, namely the so-called metastases, are of such a lessened virulence or rather are being so much more successfully coped with, that operation is unnecessary and that they will either cure themselves by absorption and reconstruction or at the worst a small abscess will form, which will open itself and perhaps extrude a very small sequestrum.

If the attack is septicæmic, the outlook is hopeless. If gravely toxic, joints affected and metastases many, death may occur from toxæmia. Short of this the prognosis is good and it is but seldom that any fatal effects occur from long continued suppuration and absorption as the result of massive sequestration.

Treatment.

Treatment in these cases must be on the following lines: (i) Directed against the blood infection; (ii) to insure drainage of the pus when it forms; (iii) to insure recovery with as little sequestration as possible.

So far no treatment of the blood infection can be said to be of any real value. Serums and vaccines would seem to show no specific effect. "Mercurochrome" fails at any rate in the staphylococcal infections. Immuno-transfusion would seem to be of more value, but one would require to obtain the *Staphylococcus aureus* at its proper phase, when the selectivity for bone is present.

As regards drainage, we have to group the cases into (*a*) those found before any pus is present, (*b*) those where the pus is confined to the bone and (*c*) those where the pus has exuded from the bone and lifted the periosteum.

When the bone is the seat of inflammation, there may not be sufficient reaction to form frank pus. If we believe Starr's theory that the course of the inflammation tracks along to the surface of the bone just below the epiphyseal plate and then extends under the periosteum, from which it is dammed back into the bone again through the Haversian system, obviously it would be sufficient to make the incision merely through the periosteum. If, however, we believe, as I feel that our clinical experience demands that we should, that the inflammatory condition penetrates through the medulla, at the same time as it tends to become subperiosteal, and continues to penetrate until the individual's' resistance is raised to wall off its further advance, then will come the question of how much interference is necessary.

The day of extensive operation of "guttering" the whole length of the spongy bone is, I trust, gone and when we realize how efficiently the Haversian system acts as a drain from the red

marrow to the periosteum, we must conclude that beyond opening the periosteum, not much more is needed; personal experience convinces me that in the acute cases in which no pus has yet been formed, a small drill hole by a small trephine through the cortex at the region of the metaphysis will suffice.

When pus is found on trephining the cortex and none is exuded under the periosteum, a similar small trephine opening will suffice.

In both these cases one must be sure that no pus has exuded under the periosteum and that we are not examining a surface of the bone remote from the site of infection. At times we find no pus on the antero-internal surface of the tibia, whereas if we run a director gently round the end of the diaphysis under the periosteum on each side, we may find the pus on one of the other surfaces. In the same way when the lower end of the femur is affected, we should always make the point of examining the periosteum on the posterior surface of the lower end of the shaft.

When pus has exuded under the periosteum and stripped it up, the condition belongs to a somewhat difficult category, in that the Haversian system has acted as an efficient drain, the walling off process of the abscess has been effected, as is shown by the fact that pus is present. The periosteum remains the bar to free drainage into the soft tissues and until it is softened enough to be perforated, will strip up more and more as further pus is exuded. In these cases free incision through the raised periosteum will give sufficient drainage and there will be no further spread in the deeper parts of the bone, but as the cortical bone is nourished by the deeper layer of the periosteum from which it is now separated, the cortex must separate off as a sequestrum. In these conditions drainage can be obtained by free incision of the periosteum, but sequestration and prolonged convalescence can be in great measure obviated by removing the shell of white avascular cortex. This can be done by a series of trephine holes round the periphery and removal with a chisel of the thin shell of dead cortex. Bones treated this way will heal more rapidly and perhaps with only the extrusion of small spicules of necrotic trabeculæ.

Rarely, however, one may find that the cortex though denuded of periosteum shows small reddened areas, these being not absolutely avascular. In these cases incision of the periosteum alone will suffice and there may be healing without any sequestration.

I have no personal experience of diaphysectomy, but quoted results show that at times there is failure of regeneration and it is interesting to note that it has been pointed out that skiagrams of many of the limbs after diaphysectomy had been performed, reveal that it had been done below the metaphysis. One feels the diaphysectomy is an extreme form of interference that is not justifiable and that very much simpler measures will give adequate drainage and further that as osteo-myelitis is a local inflammation in the course of a blood infection, the diaphysectomy does not strike at the root.

Separation of the squestra takes a variable time according to the size and density of the bone to be removed. For small spicules six weeks is not unusual. For long areas of a shaft of a long bone as much as five months may be taken. It is usual to wait before undertaking its removal until the sequestrum is seen in the skiagram to be separated off or a probe demonstrates its mobility. I think that in most cases one can interfere with safety before this, namely when the edges of the sequestrum are free; the remainder can be chiselled off.

When removing the sequestrum, it is sufficient to unite up two or more of the cloacal openings and to remove the sequestrum, if necessary breaking it up to facilitate its exit rather than to open up through the involucrum the whole length of the cavity.

There is never any need to gouge out the whole cavity or to scrape it free of granulations.

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ACUTE OSTEO-MYELITIS.[1]

By W. Vickers, M.B. (Sydney),

Honorary Surgeon, Royal Alexandra Hospital for Children, Camperdown; Honorary Orthopædic Surgeon, The Coast Hospital, New South Wales.

In dealing with a case of acute osteo-myelitis we have to consider (i) the general infection of the patient, (ii) the treatment of the bone affected, (iii) the treatment of other tissues, particularly the joints into the formation of which the affected bones enter.

With the general infection I do not propose to deal. Undoubtedly many cases of osteo-myelitis begin with a virulent blood infection and the bone condition is only of minor importance. In other cases, although the infection reaches the bone by way of the blood stream, the condition of the bone becomes of the greatest importance.

[1] Read at a meeting of the New South Wales Branch of the British Medical Association in conjunction with the Section of Orthopædics, the Section of Surgery and the Section of Pædiatrics on October 25, 1928.

The treatment of the bone involved in a case of acute osteo-myelitis will depend on the stage it has reached when it comes under observation.

If a patient is seen with a definite spot of tenderness at the end of a long bone and a rise of temperature that is otherwise unexplained, an incision should be made at once down to the bone. If no pus is found on incising the periosteum, a dissector should be passed around the bone under the periosteum, because it frequently happens that the periosteum is not lifted for the whole circumference of the bone. If this fails to reveal pus, an opening should be made into the cancellous bone with a drill and if pus is found, the compact bone should be removed with a gouge until the limit of the suppuration is reached. In this way necrosis will be limited, the risk of organisms passing into the blood stream will be minimized and the course of the disease will be shortened. In these early cases healing may occur without sequestration. If a subperiosteal abscess is found, I consider that we cannot take it that adequate drainage is established; the compact bone should be removed, as already mentioned, over the area of the affected bone. Some sequestration will occur, but massive necrosis will be prevented. In those cases in which the periosteum is lifted up from the whole length of the bone, leaving the bone completely surrounded by pus, much necrosis will take place frequently with sequestration of the whole length of the shaft. I have had no experience of diaphysectomy, but am of opinion that this condition constitutes the only one in which it might be justifiable. The general opinion of the operation seems to be that it offers a prospect of rapid healing, but that this is more than counterbalanced by the shortening that frequently occurs and the risk of non-replacement of bone.

My own views and my own practice are summed up in the remarks of Ogilvie as follows:

> The immediate necessity is drainage, because the severe symptoms are due to the fact that osteo-myelitis occurs in a cavity with rigid walls and is dangerous because the blood vessels in that cavity are sinusoids with thin walls through which pus can reach the general circulation. The demands of free drainage require that the medullary cavity be laid open for the length that is infected, but that is all that is immediately necessary. The compact bone is removed for one-third of the circumference and in length as far as pus is found in the medulla, but no further. Wider resection is unnecessary and may leave a weak bone. Less wide may delay healing, for a deep and narrow cavity or a series of drill holes cannot fill up for mechanical reasons, while a flattened trough can always close by approximation of the soft tissues.

In addition to the treatment of the bone there is, as I have already mentioned, the treatment of the joints above and below the bone affected. I do not propose to deal with the spread of infection into the joint resulting in septic arthritis, but with the result of infection on the soft tissues and ligaments and their effect on the joints into the formation of which the affected bone enters. Some muscles are thrown out of action; the pull of others being unopposed, leads to deformity at the joint. It is not uncommon to find a patient recover from an attack of osteo-myelitis with a good result as far as the bone is concerned, but with a flexed and subluxated knee, a foot fixed in *equinus*, a hip in adduction and flexion or a humerus fixed to the side. It is essential at the outset of treatment to keep this possibility in mind. It is impossible in some cases on account of the swelling to apply any form of splint at first. Some limbs are so œdematous that any form of firm bandaging will cause pressure sores, but as soon as possible and before any contractures have occurred, it is important to see that the limb is placed in such a position that contractures cannot occur or, if ankylosis is inevitable, that it occurs in the best position for use of the limb. With regard to the knee joint deformity is particularly likely to occur. Here slackness of the capsule and ligaments entering into the formation of the joint occurs, the joint quickly assumes a flexed position, the posterior portion of the capsule shortens leading to subluxation and external rotation of the limb. Even when the joint itself has not become infected, such a condition is very difficult to cure. When it has existed for a considerable time cure is impossible without the removal of a wedge of bone which results in shortening of the limb.[1]

Prevention of these deformities can best be effected by the use of a back splint or a Thomas's knee splint with or without extension. Once the deformity has occurred, prolonged treatment with a series of Plaster of Paris casts and extension may be necessary. The deformity, if left, is a particularly crippling one.

In one patient with acute osteo-myelitis of the upper end of the humerus the lesion healed in ankylosis of the shoulder joint. No attempt was made during treatment to keep the arm abducted and the result is a limb that is much less useful than it would have been had the arm been kept in abduction.

Infection of the upper end of the femur may cause several deformities. Flexion and adduction occur insidiously and a severe degree of deformity may occur before it is noticed. This produces relative shortening of the limb, tilting of the pelvis and lateral curvature of the spine. If the lesion is in the neck of the femur, pathological fracture of the neck may be produced. Unless this is recognized and treated, the shaft of the femur will travel up, the muscles and ligaments will contract and the result will be permanent shortening of the limb of two or three inches.

I have a skiagram of a leg affected with osteomyelitis of the femur at the time of admission to hospital after treatment had been carried out for five months. No extension was used. Fracture of the neck had occurred, the shaft had travelled up and there is now a permanent shortening of nearly six and a half centimetres (about two and a half inches). Treatment at this stage failed to alter the result.

[1] A slide was shown of a patient in whom an extreme degree of flexion and subluxation had occurred; it illustrated some of these points.

In another case the child reached hospital seven weeks after the commencement of the infection. Two incisions were made down to the bone and the area drained. No extension was applied. As in the other patient the shaft of the femur had travelled up and this limb was six and a half centimetres (two and a half inches) shorter than the other and was adducted. Extension was applied and the limb kept in abduction. In other skiagrams it can be seen how the bone was reformed and the angle of the neck on the shaft of the femur restored. One child now has only thirteen millimetres (half an inch) of shortening, has a good range of movement and is just as active as his brothers. Had this child remained a few more weeks without treatment, it is extremely likely that he would have had considerable permanent disability.

In summing up I should state the following conclusions:

1. Acute osteo-myelitis is a disease demanding urgent treatment.

2. The first consideration is adequate drainage in order to limit the area of bone involved and the risk to life from the spread of organisms to the blood stream.

3. Next in importance is the prevention of contractures and deformities which will readily occur unless careful splinting and extension are applied at the earliest possible moment.

OSTEO-MYELITIS OF LOCAL INFECTION.[1]

By J. COLVIN STOREY, O.B.E., V.D., M.B., Ch.M. (Sydney), F.R.C.S. (England), F.C.S.A.,
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THE division of bone inflammation that has been allotted to me is that concerned with local infection. At the outset I owe you all an apology, for I have not written a paper, but have just jotted down a few headings and propose to open the question by bringing out certain points that have occurred to me from the experience that I have of these conditions.

The original idea was that Dr. Wade was to read a paper and Dr. Vickers and myself were to "throw bricks" at him. It is just as well that this arrangement was altered for I would have found but few bricks. I have Dr. Wade's permission to say something about hæmatogenous osteo-myelitis later on.

The simplest form of bone injury is the well-known "kick on the shin." Here we get a raised periosteum with blood clot underneath it. As you all know, in the healing process where bone is concerned, ordinary scar tissue is replaced by new bone, because the cells are osteoblasts and naturally when stirred into activity they conform to their usual function and form bone. We thus, as an end result, get a little thickening of the injured bone. Now, in such an injury bacteria may be introduced locally either at the time of trauma or subsequent to it. A process of inflammation is then set up. This reaction may cease at any stage from slight hyperæmia to death of tissue, dead tissue in this case being called a sequestrum. The whole process of the reaction has to be gone through, sequestration and exfoliation, before the wound heals. The sequestrum takes the form of a flake of dead bone and under favourable circumstances the wound heals when this is cast off.

PERFORATING WOUNDS OF BONE WITHOUT FRACTURE.

In military practice perforating wounds are either gunshot or bayonet wounds and in civil work exactly the same conditions obtain when any object perforates the bone. In this type of injury there is every likelihood of bacteria being carried into the depths of the wound and setting up local inflammation.

COMPOUND FRACTURES.

The most important division of local bone inflammation comes under the heading of compound fractures. The fracture may be rendered compound from within or from without. In the former case either the causative violence or injudicious first aid forces part of one or many fragments through the skin and so introduces the seat of fracture to the outside world. In the latter case the weapon, missile or object causing the damage also wounds the skin and underlying tissues and often enough carries gross dirt deep into the damaged bone. It is in this type of injury that we meet the worst cases of local bone inflammation. In addition to the presence of bacteria in the wound, the soil is most efficiently prepared for their activity, by the damage to all the tissues and the presence of considerable blood clot. Before the fracture can unite, sequestra have to be formed and exfoliated and usually after a very prolonged illness the involucrum forms the joining bridge of bone. There seems to be no tendency for other bones to be affected by the blood stream as in hæmatogenous osteo-myelitis. Although the profound toxæmia from poisons made at site of wound may kill or septicæmia may supervene, the organisms have no predilection for bone, as they may have in ordinary osteo-myelitis. Septicæmia is uncommon in these circumstances, whilst severe toxæmia is the rule.

Gas gangrene is a disease of muscles and I just mention it in passing as it may complicate a compound fracture. We have had two or three cases at Royal Prince Alfred Hospital lately and the patients seemed to benefit from the administration of serum and of course wide opening of the wound after amputation.

TREATMENT.

Treatment resolves itself into prophylaxis and therapy.

Prophylaxis.

Prophylaxis should commence from the very first. How many of us have been told by unfortunate

[1] Read at a meeting of the New South Wales Branch of the British Medical Association, together with the Section of Orthopædics, the Section of Surgery and the Section of Pædiatrics, on October 25, 1928.

patients that "the bone was not sticking through the skin until they lifted me up." The public should be educated to leave the injured alone till someone responsible is on the scene. A patient told me the other day that he had flatly refused to allow anybody to touch him till the ambulance arrived, but not all patients are as wise as this, nor are some of them conscious enough, had they the necessary caution. I am quite sure that a soldier wounded in battle, apart from the inconvenience of "coalboxes" and other flying objects, got far more efficient first aid than a man who gets a compound fracture in any street in Sydney. I can see no reason why every person with a fracture of the thigh should not have a Thomas knee splint applied over his clothes and slight extension put on with a bottle knot over the boot and the leg slung from an iron bar fixed to the stretcher. These patients would carry much better and would arrive at hospital in a much less shocked condition than they now do.

Therapy.

Rest.

The essential treatment of all these wounds, whether the bone is involved or not, is rest. And this should be assured from the very beginning. The limb involved should be put on a suitable splint, preferably of the Thomas skeleton type, at the inception of treatment. Without the exhibition of adequate rest all the latest scientific methods you may like to employ, will perhaps be unavailing. We used to notice on service that patients with wounds adequately splinted travelled far more kindly than those not so treated.

We all know how foolish it is for a medical man to render first aid. There is always some busybody who knows all about it. I can tell you of an amusing incident at my own expense. The other evening when I was returning from Royal Prince Alfred Hospital a man was spilled out of a side car right in front of my path and I had to stop. When I alighted they were bundling a very pale and shocked patient like a bag of chaff into a car, whereupon I hinted that it would be wiser to place him quietly in a store near by and ring the ambulance. For my pains I was abused; even when I mentioned that I was a medical man every one was far too excited to pay much attention and I ended by telling them to do just as they liked.

I regret to say that I sometimes see shocked patients being lifted off a stretcher into bed in very much the same way as that man was lifted and this in hospital. A patient should be lifted into bed on his stretcher and quietly lifted or rolled off the canvas. I am quite sure that shock is often increased by rough lifting of patients. No less than three persons should attempt to lift an adult patient and one of those three should have instructions to care for the injured part.

Suturing.

As far as suturing is concerned, I hesitate to refer to young people, for I am fairly young myself, but I may say that those who are inexperienced in the treatment of war wounds and compound fractures, are far too assiduous in stitching. It does an incalculable amount of harm. As a general rule no sutures whatever should be inserted in cases of compound fracture.

In regard to wounds generally, those occurring in machinery indoors seem to do well; the oil, far from being harmful, seems to act as a balm. Not so street wounds; these are particularly dangerous and should never be sutured. The same rule of course applies to wounds made in soil or rubbish.

Tetanus.

All patients wounded in the street or garden or any place about which you can doubt the cleanliness, should have a prophylactic injection of antitetanic serum. At the war we had to inject the serum for the slightest scratch—the authorities thought it worth while to preserve man power—and surely a civilian is worthy of similar protection.

Shock.

No patient should be actively treated till he has recovered from shock; the only justifiable interference is the control of hæmorrhage. Actual wound-devitalized tissue should be excised, care always being taken that the *"débridement"* does not become a *"dénouement."* Wash away gross dirt with saline solution or sterile water and I have a liking for the use of ether to cleanse wounds. The use of bismuth, iodoform and paraffin paste, "B.I.P.P.", as introduced by Rutherford Morrison, seems to be an efficient method of wound treatment.

Most important of all, always leave the wound wide open; it is much wiser to do this than to poke rubber tubes about in a wound whose drainage you have prevented by injudicious suturing.

With regard to loose pieces of bone, the small and devitalized portions had better be removed, while large fragments are better left *in situ*.

HÆMATOGENOUS OSTEO-MYELITIS.

Now I come to the question of blood borne infection in cases of bone disease. I just wish to mention a subject that has often caused me considerable worry in dealing with these cases. It is the question of the wisdom or folly of urgent operation. I always feel that the bone inflammation is only an incident in a general infection and fear that by adding surgical trauma to a sick patient we may be doing harm. I would like very much to hear what other surgeons think about this aspect of osteo-myelitis. I have been convinced for a long time that the whole issue is a contest between the infecting organism and the host. If the organism wins, then the patient dies, if on the other hand the host wins, then the patient survives. I have often wondered whether it would not be wiser when confronted with a very acute infection to wait and put the patient in the best position for the fight by placing him at rest, general and local, the latter by suitable splinting and only operate when there are frank signs of deep pus. I remember having an argument with a

colleague about a patient with all classical signs of acute suppuration at the upper end of the femur involving apparently the hip. It ended by my exposing the neck of the femur and incising the joint capsule to the satisfaction of all present without finding any pus. It took a fortnight for pus to come to the exterior in that case and I am quite sure that no good was done the lad by a precipitate operation. I am persuaded that a great deal of harm can be done in an acute case by too extensive an operation. By waiting we can run no danger of allowing the pus to burst into a region where it will do harm, as in the case of some intraabdominal suppurations.

Some of the worst infections are frank septicæmias with a transient involvement of bone; it surely must be bad surgery to interfere with these. Professor John Fraser, of Edinburgh, whose opinion I value very much, has advocated a conservative treatment of the pneumococcal bone inflammations, but how are we to know which are the pneumococcal infections in the case of bone? I am convinced that we do not influence the amount of bone involved by early operation and if by accident the epiphysis is interfered with we may spread the trouble from the metaphysis to epiphysis and so involve the joint.

It has often worried me very much to think that when the patient is trying to work out his immunity to the invading organism, we may spoil his chances by the shock and injury of untimely surgical interference. I am quite sure that all that should be done is to open down on the most tender spot and if pus be found, stop. I think that when pus is not found, the only interference with bone that is justifiable, is the drilling of small holes with a little trephine or drill. The extensive trauma of mallet and chisel is to be avoided.

The wound should be left open to provide for drainage and it would be wise to splint the limb more than has been our custom in the past. I have no wish to be dogmatic about this question, but I often think of Dr. Foreman's old and apposite saying, "If you can't do a patient any good, don't do her any harm."

ANALGESIA DURING LABOUR.[1]

By E. BRETTINGHAM MOORE, M.B., Ch.M. (Sydney), *Hobart.*

IN the following account of a method of producing analgesia during labour I give the procedure which I have followed for the past three and a half years, being, I believe, the first to use it in Tasmania if not in Australia. The method was suggested by Dr. J. T. Gwathmey in 1923 as a means of ameliorating labour pains by a simple and harmless method which could be carried out in either home or hospital. It was first tested out in the New York Lying-In Hospital. It is now a routine method at this and other large hospitals in America.

Last year Dr. J. E. Harrar reported 5,800 cases at the New York Lying-In Hospital, of which more anon. I am reporting a series of 150 consecutive cases in my own private practice and also a series of 42 consecutive cases which were carried out by the nursing staff of the Queen Alexandra Hospital. This latter series will demonstrate the simplicity of the method and its suitability for institutional treatment. My thanks are due to my fellow members of the honorary staff for permission to use it on their ward patients and to the nursing staff for their cordial cooperation. I may say that the method, being a new one, has met with considerable opposition locally, as one would expect in a small place, and I hope these notes will do something to dispel this.

The following is an account of the technique recommended by Dr. Gwathmey and carried out in the New York Lying-In Hospital. I have, as you will see later, modified the details somewhat to allow a closer coordination to the needs of the patient.

Dr. Gwathmey claims a definite synergistic action between morphine and magnesium sulphate, particularly as to the duration of the narcotic effect.

The drugs required are morphine sulphate, magnesium sulphate, quinine and ether. The treatment should not be started until the woman is in active labour. The pains should be at least five minute intervals and lasting forty seconds. At this time a cleansing soapsuds enema is given and this is followed by the primary intramuscular injection of 0·01 to 0·015 gramme (one-sixth to one-quarter of a grain) morphine sulphate *plus* two cubic centimetres of 50% solution of magnesium sulphate.

The rectum must be both empty and quiescent to retain the instillation of ether and olive oil that is to follow. After this injection the patient is to be kept quiet and in a darkened room with ears plugged, if necessary, to insure absence of outside stimuli.

Twenty minutes later a second intramuscular injection of two cubic centimetres of magnesium sulphate is given.

The retention enema has the following composition: Quinine 1·2 gramme (twenty grains), ether 75 cubic centimetres (two and a half ounces), alcohol 2·4 cubic centimetres (forty minims), olive oil to 120 cubic centimetres (four ounces).

If the effect of the intramuscular injection is sufficiently sedative, withhold this rectal instillation until the pains are beginning to be felt by the patient, when it should be given as follows.

The apparatus consists of a funnel attached to a sixty centimetre (two foot) length of rubber tubing which in turn is connected by a glass tip to a stout rubber catheter or small rectal tube.

The patient is placed on her left side with hips elevated, she is told to "draw up" her sphincter during pains to avoid losing the fluid. Run a little warm olive oil into the tube to expel the air and then slowly pour in the mixture. The tube should have been inserted ten centimetres (four inches) or over. When all the mixture is in the tube thirty cubic centimetres (one ounce) of olive oil should be poured in to push the last of it from the tube

[1] Read at a meeting of the Tasmanian Branch of the British Medical Association on October 9, 1928.

into the rectum. The tube is then clamped and withdrawn. Should a uterine contraction occur during or shortly after the instillation, make pressure over the anus with a folded towel. A third intramuscular injection of two cubic centimetres of 50% magnesium sulphate is then given immediately to prolong the action of the ether. The same quiet is maintained as before. The patient is drowsy and sleeps between her pains, but consciousness is not lost. I have had patients tell me that they could feel the contractions, but that they were not painful. When the effect of the first ether instillation is wearing off, a second or even a third may be given; these subsequent instillations contain only 0·6 gramme (ten grains) of quinine instead of 1·2 grammes (twenty grains) and are accompanied by an intramuscular injection of magnesium sulphate.

Contrary to some authorities, Dr. Losee, of the New York Lying-In Hospital, has definitely proved the rectal absorption of the quinine by its qualitative recovery from the urine in ninety-two out of one hundred parturients.

Dr. Harrar, of the above hospital, states that "after a trial of 5,800 cases, this method of all procedures so far studied is without danger to mother or child"; that it has "twice the applicability of scopolamine anæsthesia"; that "there has been no increase of *post partum* hæmorrhage and no increase in the still-birth rate."

For the last two years I have made the following modification suggested by Dr. Gwathmey's own technique for rectal anæsthesia in general surgery.

I give a primary injection of 0·01 gramme (one-sixth of a grain) of morphine and two cubic centimetres of 50% magnesium sulphate followed immediately by sixty cubic centimetres (two ounces) of 50% ether in olive oil to which 0·42 gramme (seven grains) of chloretone has been added as a local anæsthetic. The result is to prolong the effect of the first injection and to render the second or main injection less likely to be expelled.

I regard the magnesium sulphate as the most troublesome factor in this method, as it is very irritating in such high concentration and in my experience has caused two abscesses. Dr. Harrar reports five abscesses from the same cause. Some doubt has lately been cast on the synergism between this drug and morphine by Dr. Harry Beckman, of the Department of Pharmacology, Marquette University, and this prompted me to seek a substitute for this combination with promising results. The cases are too few as yet to publish, but I hope to be able to report improvement in a later series.

In the first series of one hundred and fifty patients there were 71 *primiparæ*. Of the remainder 41 were confined of their second child, 19 of their third, 11 of their fourth, six of their fifth and two of their eighth. The ages of the patients varied from seventeen to forty-six years. The presentation was occipito-anterior in 89 and occipito-posterior in 37; the position was diagnosed at an early stage and righted naturally or by Buist's method in most cases; in 21 manual rotation of an occipito-posterior presentation was performed. In two instances the breech presented and in one the presentation was transverse. Sixty patients received one injection only, eighty-one received two and nine received three injections. Labours were classified as short, medium or long if pains occurring at fifteen minute intervals or less, have lasted under six, under twelve or over twelve hours respectively. According to this classification 48 were short, 47 were medium and 37 long; seven were very long and ten were long and very difficult; in regard to one patient no record was made. The result was good in 110 instances, moderately good in 35 and poor in five. The low forceps operation was performed in 116 cases, the medium in 23. Natural delivery occurred in nine and no record was kept in regard to two patients.

In no case was an infant delivered in an occipito-posterior position and I have yet to meet the case which cannot be corrected manually. There were four still-births in this series, but I would remind my listeners that as I am practising in this work as a specialist, I get an undue proportion of difficult cases.

Of the four one fœtus was macerated. The second child was 5·6 kilograms (twelve and a half pounds), the mother having refused induction. The third was delivered with difficulty after a long and strenuous labour. The fourth was born after induction by the London method, so there is a reasonable doubt as to whether it might be ascribed to uterine spasm caused by the quinine and pituitrin (see article in *American Journal of Obstetrics and Gynecology*, October, 1926, by Dr. W. A. Scott).

Of the 42 patients in the second series, 21 received one injection and 21 received two. The result was very good in ten instances, good in 15, moderately good in 16 and in one instance there was no apparent result. In two instances delivery was by forceps and one child was stillborn. The birth of this child was a natural one and the result of one injection was very good.

To me the most pleasing and striking result is the condition of the mother after her confinement. She has been spared the fatigue of pain which is, I think, far more exhausting than the actual energy expended in the expulsion of the infant, and often expresses herself as feeling able to get up at once if she were allowed.

I have never noticed any excitement while the patient is under the analgesia and the placidity of the patient is so pronounced that the nursing staff has dubbed the method "silent labour."

TRAUMATIC RUPTURE OF THE NORMAL SPLEEN.

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THE normal spleen is so well protected by the ribs that it is not frequently injured. When, however, the organ is torn by violence, the life of the

owner is placed in immediate danger and in the majority of instances only skilful surgical interference will avert disaster. Occasionally the injuries to the spleen and other tissues are so severe that death is inevitable; on the other hand, the damage to the spleen may be so slight as to pass undiagnosed. As a rule when a positive diagnosis is made, immediate operation should be undertaken to remove the damaged organ. Nature has proved to be inefficient in the treatment of this condition and removal of the spleen is the most certain method of controlling the hæmorrhage. Apparently the loss of the organ does not affect very gravely the physiological processes of the organism as a whole.

In this paper it is proposed to discuss chiefly the details of surgical procedure.

After the initial injury there ensues a state of shock more or less profound and of variable duration. There may then be an interval of some hours or even days before unequivocal signs of rupture of the spleen with intraperitoneal hæmorrhage appear or there may be no such interval. In Case I of this paper severe hæmorrhage occurred nine days after the injury. The signs and symptoms of rupture of the spleen need not be discussed, but this opportunity may be taken to point out that advanced signs of internal hæmorrhage, if not present, should not be awaited. Splenectomy whilst the patient is in good condition, is not as a rule a dangerous procedure. It becomes a matter of extreme anxiety when owing to loss of blood the blood pressure has fallen below 80 millimetres of mercury.

Treatment.

In uncomplicated cases treatment resolves itself into: (i) Combating shock and collapse if present and severe; (ii) replenishing the blood volume, if necessary; (iii) checking further hæmorrhage.

Combating Shock and Collapse.

Sometimes the patient's condition is quite good, as in Cases II and IV and operation may be undertaken as soon as convenient. When, however, there is extreme collapse, as in the patients in Cases III, V and VI, in whom the blood pressures were respectively 58, 75 and 65 millimetres of mercury, then immediate operation is out of the question and measures must be taken without loss of time to combat shock and restore the blood volume. Morphine is administered and the patient is warmed in any way which may be convenient. Stimulants are of little use.

Replenishing the Blood Volume.

Should general signs of extreme loss of blood from the vascular system be present, such as pallor, air hunger, fall of blood pressure below 90 millimetres of mercury, steps should be taken to replenish the blood store. As a rule five to six hundred cubic centimetres of compatible foreign blood should be transfused, together with the same quantity or more of saline solution. In these patients no such fluid as gum saline solution will take the place of blood. As the blood is run into the patient's veins there is almost always an improvement in his general condition, as evidenced by better colour, steadying of the pulse and rise of blood pressure. The citrate method of transfusing blood is used as a rule, being the simplest.

Checking Further Hæmorrhage.

As bleeding may be still going on and as the only certain way of checking it is by operative measures, there should be no unnecessary delay before commencing the operation. In conditions such as obtained in Cases II and IV there is no need for excessive hurry and the abdomen may be opened and the spleen removed methodically. Ether by the open method or ethylene and oxygen anæsthesia is satisfactory. When the condition of the patient is grave, every precaution must be taken to insure against further unnecessary shock. Local anæsthesia is desirable and the upper left rectus area should be blocked off by 0·5% "Novocain" solution injected into the rectus sheath or around the lower six left intercostal nerves. Ethylene or nitrous oxide and oxygen anæsthesia if available, may be used later to supplement the local block, otherwise light ether anæsthesia should be induced. The "Novocain" is injected whilst blood is being transfused. A dental syringe and needle are used for the production of intradermal wheals, the introduction being practically painless. Thus, at the conclusion of the transfusion of blood, good anæsthesia of the abdominal wall should have been attained. The transfusion cannula is left in the vein after washing through with a little saline or sodium citrate solution.

As soon as improvement in the patient's general condition is observed, an ample incision is made rapidly through the left rectus muscle into the abdomen. Blood is rapidly ladled out by the cupped hands into kidney dishes containing a little sodium citrate solution (3·8%). The author has found that blood is collected most quickly in this way. An assistant immediately proceeds to pour the blood so collected (except when there is evidence of contamination, as in Case VI) through about six layers of gauze loosely fixed over a funnel which is connected by a tube to the cannula previously used for transfusion. Whilst the operation for splenectomy proceeds, the assistant continues to infuse the patient's own blood back into his vascular system.

No time should be lost in endeavouring to cleanse the peritoneal cavity of blood. A hand is thrust gently to the region of the spleen, clot is removed and the spleen examined by touch. Removal having been decided upon, the organ is grasped firmly in one hand and drawn into view. Bands of peritoneum which pass to the diaphragm, are snicked through with scissors, no attempt being made to ligature them, as this would occasion great loss of valuable time and the bands do not contain any but very small vessels. The pedicle of the

spleen is next ligated, one or more strong catgut ligatures being used as may seem to be necessary. The pedicle is then divided and the organ removed. A rapid search is then made for other bleeding points or accompanying injuries to other organs and any necessary repairs are effected. The abdomen is then closed; methodically in layers if the condition of the patient is not causing anxiety; by through-and-through sutures if there is need for speed. The whole operation time from incision to closure of the wound should not be more than from fifteen to twenty minutes.

During the course of the operation the surgeon should pay close attention to the general condition of his patient. The anæsthetist can supply valuable information by closely observing the colour of the patient, his breathing, pulse rate and volume and blood pressure. When the general state of the patient is satisfactory, the surgeon may pay more attention to such details as cleansing of the peritoneal cavity of blood, suturing the wound in layers and so on. He may dissect free the rectus muscle and retract it laterally if he so desires. When, however, great speed is necessary, time may be saved by incising through the rectus muscle, rapidly evacuating and collecting the major portion of the effused blood as described and neglecting the toilette of the peritoneum, except in so far as is necessary in order to perform ligature of the pedicle. If the spleen is fixed by bands in the cupola of the diaphragm, some force must be used to tear or cut through these bands and free the organ. The risk of hæmorrhage is small and must be taken in order to save much valuable time. Once the spleen is delivered into the wound, the ligature of the pedicle is easy, due regard being paid to the tail of the pancreas. A clamp should not be applied as a rule. The wound is closed by interrupted silkworm gut sutures penetrating the whole thickness of the abdominal wall.

Results.

Of recent years there has been a great falling off in the mortality percentage. Thus in 1909 Finkelstein[1] collected data of 191 patients of whom 71 died (39·8%). In the period 1910-1915 the mortality was 19·3%. Of the six patients whose histories are here reported, only one died as a result of abdominal injuries (Case I), although another died three months later from infection of the knee joints. The improvement in results is due to:

1. The use of local in combination with gas or very light ether anæsthesia.

2. The use of transfusion both of foreign and of effused blood.

In Cases I, III, V and VI it was thought necessary to transfuse foreign blood prior to operation. In the last three operation followed immediately and in two of these (III and V) as well as in Case IV effused blood was collected, citrated, filtered and returned to the owner's vascular system. In Case VI this could not be done as a coil of gut was torn. In Case I it is probable that had the effused blood been collected and infused the patient's life would have been saved.

In a recent paper,[2] Devine and Kinsella in reporting a case in which autotransfusion was resorted to, state that the subject has been neglected in British literature. It is probable that the practice at any rate has not been so neglected. At the general hospital to which the author is attached, autotransfusion has been used for some years past with excellent results, more particularly in the treatment of ruptured ectopic gestations.

Case Reports.

CASE I.—Multiple injuries including fractured patella; ruptured spleen and probably injuries to the left kidney; delayed hæmorrhage; death. E.P., a male, aged twenty-one years, was admitted to hospital on October 27, 1927. Shortly before this he had sustained injuries as a result of a motor cycle accident. He was recovering consciousness when admitted. He complained of pain in the left shoulder region and in the right leg. The right patella was found to be fractured. There was apparently no abnormality elsewhere apart from a few abrasions. Next day the patient complained of pain in the abdomen and on examination the muscles in the left costo-vertebral angle appeared to be on guard and palpation caused pain. The urine was found to contain large numbers of red blood cells. Gradually the patient settled down and after eight days an operation was performed by a colleague for the repair of the injured patella.

The next day the man had a sharp pain in the abdomen and on palpation fairly widespread tenderness was detected. The following day his condition became worse and when seen by the author for the first time (the colleague being out of town), he was obviously suffering from internal hæmorrhage. At 3.30 p.m. 568 cubic centimetres (one pint) of blood were transfused and at 5 p.m. the abdomen was opened by a left paramedian incision. The peritoneal cavity contained much blood. The kidneys appeared to be normal on palpation. The spleen was being explored when the condition of the patient became so alarming that the wound was rapidly closed and the patient returned to the ward. He died at 9 p.m.

Several factors combined to procure such an ill result. In the first place the early evidence of intraperitoneal damage was slight and followed by such improvement that operative treatment of the fractured patella could be undertaken on the eighth day. When the delayed hæmorrhage occurred, the surgeon in charge of the patient was away and considerable delay ensued. Local anæsthesia was not used nor was autotransfusion resorted to. There is no doubt that the patient might have been saved by more skilful management.

CASE II.—Injuries resulting in rupture of spleen; recovery. K.C., a male, aged sixteen years, was thrown from a motor cycle in collision with a car. On admission at 10.40 a.m. on January 25, 1928, about one hour after the injury, there was a generalized increase in the resistance offered by the abdominal muscles to palpation, but at first very little tenderness. There appeared to be abnormal dulness on percussion in the splenic area. The boy's general condition was quite good. At 4 p.m. under ether anæsthesia a left upper paramedian incision was made. The spleen was found to be torn almost in two transversely. Removal was somewhat difficult as the organ was fixed posteriorly by peritoneal folds. As a result of rather prolonged manipulation the general condition of the patient became decidedly worse. At the end of the operation gum saline solution was infused into the vascular system. Later 568 cubic centimetres (a pint) of compatible foreign blood were transfused. Convalescence was uneventful and up to the present the boy has been quite well.

CASE III.—Injuries resulting in rupture of the spleen; recovery. A.C., a male, aged thirty-eight years, whilst

inebriated fell down a flight of stairs about eight hours before admission on April 1, 1928. He was then in pain and looked extremely pale and collapsed. The abdomen was distended, tender generally, not very rigid and dull in the flanks and especially the splenic area on percussion. The systolic blood pressure was about 58 millimetres of mercury, the pulse rate 156. As soon as a donor could be found 568 cubic centimetres (a pint) of blood were transfused into the patient's veins and operation was immediately undertaken. During the transfusion the right upper rectus area was blocked off by "Novocain" and later this anæsthesia was supplemented by ethylene gas anæsthesia. A large incision was rapidly made through the left rectus muscle into the abdomen. Much blood was ladled out into dishes and after citration filtered through gauze and run into the patient's vascular system through the transfusion apparatus. . The spleen was rapidly delivered, its posterior attachments being simply torn through. The pedicle was tied and the organ removed. The wound was then closed. The spleen was damaged grossly and showed several ragged tears through the substance. In addition to the foreign blood 1·2 litres (two pints) of saline solution and about 0·25 litre (half a pint) of the patient's own blood were infused.

In the early days after operation there was a good deal of abdominal discomfort and distension, but steady progress until the patient left for a convalescent home twelve days after the date of injury.

CASE IV.—Injuries resulting in rupture of spleen; recovery. O.B., a male, aged sixteen years, was riding on the step of a tram when he was struck in the left side by a projecting part of a stationary road construction machine. He had pain in the left side of the abdomen which persisted until admission to hospital at 4.20 p.m. on April 2, 1928, about twenty-six hours after the time of injury. The pain had not been severe, but he vomited three times before admission. Pain in the left shoulder region on breathing had been present for some hours. The boy was somewhat pale, not collapsed. The abdomen moved fairly well, the left side was slightly more rigid than normal and tender. There was definite abnormal dulness on percussion over the lower ribs postero-laterally. The blood pressure was 128. Operation was performed under ethylene and oxygen anæsthesia in the usual way, blood being collected and returned to the owner's veins. The spleen was removed and found to be torn on its renal surface.

Convalescence was uneventful and the patient returned home on the fourteenth day after operation.

CASE V.—Injuries; rupture of spleen; recovery. H.H., a female, aged fifty-six years, fell out of bed thirty-six hours prior to admission and struck her left side on the corner of a box. She then felt severe pain in the left side of the abdomen, but after an hour or two improved. Later she felt ill and weak and abdominal pain increased. On admission at 6 p.m. on May 2, 1928, she was in great pain, pallid and collapsed. Her pulse was rapid, of poor volume and very irregular. The blood pressure was 75. The abdomen was distended and tender on palpation, dulness being detected in the splenic area and flanks. The woman was immediately taken to a theatre annex and radiant heat was applied whilst a donor was found. During transfusion of blood the left upper rectus area was blocked with "Novocain." Later a little ethylene and oxygen were administered. When the blood pressure rose a little in response to the warmth and transfusion of blood, an incision was made into the abdomen. Much blood was collected and after citration and filtration run into the patient's vascular system through the transfusion apparatus. The spleen was rapidly delivered and removed and the abdomen closed after scant toilette. Unfortunately no note was made of the condition of the spleen. The condition of the patient was serious, but the blood pressure, which had been 75 on admission, was 90 one hour after operation. Next morning it had risen to 100.

Convalescence was complicated by an infection of the renal tracts, but the patient made good progress and returned home on May 21, 1928, nineteen days after operation.

CASE VI.—Multiple injuries resulting in laceration of jejunum; rupture of spleen; lacerations of legs; recovery, but death after three months from infection of knee joints.

E.O., a male, aged fifty-two years, was run over by a cart twelve hours before admission on July 20, 1928. One wheel passed over the lower part of the thorax, striking the left side first. The man noted pain in the abdomen, but went on with his work for a couple of hours. The pain increased in severity. On admission the patient was very pale, cold and collapsed, his pulse being of poor volume, though only 100 to the minute. The blood pressure was 65. The abdomen was distended, tender and dull in the left upper quadrant and over the left lower ribs posteriorly. Morphine fifteen milligrammes (a quarter of a grain) was administered and radiant heat applied. At 11 p.m. the blood pressure was 60. Transfusion of 568 cubic centimetres (a pint) of blood raised it to 80 and under ethylene and oxygen anæsthesia the abdomen was opened. Some gas and a large amount of blood escaped. A coil of jejunum was found to be torn about two-thirds of the way round its circumference. This wound was sutured. The spleen was removed; it contained a small tear. The abdomen was closed. The blood collected from the peritoneal cavity being contaminated could not be used, but over half a litre of saline solution was infused instead.

The post-operative course was very troubled. On August 18, 1928, a month after operation, a collection of pus in the left iliac region was opened and drained and from this time on there was no trouble referable to the abdomen. Both knee joints became infected soon after operation and the toxæmia from this source (in spite of amputation of one leg) gradually overcame the patient's strength and he died on October 13, 1928, almost three months after operation.

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(1) B. K. Finkelstein: "On the Surgery of the Spleen," *The British Journal of Surgery*, July, 1914, page 68.

(2) H. B. Devine and V. J. Kinsella: "Auto-Transfusion," *The British Medical Journal*, September 29, 1928, page 568.

AVERROES AND AVENZOAR: EUROPE'S DEBT TO ISLAM.

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IN THE MEDICAL JOURNAL OF AUSTRALIA of December 15, 1928, I briefly reviewed the life and attainments of the Arabian physician Avicenna, endeavouring to show that to the Arabs we owe the survival of Greek culture in spite of the world-wide devastation that followed the collapse of the civilizations of Greece and Rome.

Although Avicenna himself never travelled very far and confined his teaching activities to Trans-Caucasia and Asia Minor, yet his doctrine and through this the accumulated erudition of Hippocrates, Galen, Celsus and Aristotle survived the crash of dynasties and leavened the asperities of the Moslem religion.

Where the flag of Islam waved, there the writing and teaching of Avicenna followed.

Much of the Moslem world was in a state of flux and without the security necessary for the cultivation of the liberal arts and sciences, but in one country the Moor reached a wonderful height of refinement and culture subsequent upon years of

successful conquest followed by peace. This country was Spain or rather that southern part which was for centuries the gem of the Islamic Empire.

Of the many physicians whose ability graced the courts of the Spanish Kaliphs, Averroes and Avenzoar were the most famed in their own time and remembered by posterity as the caretakers and bestowers of the lamp of culture lit by Avicenna from the lights of Greek civilization that flickered so long amid the ruins of Alexander's eastern possessions.

Averroes.

Averroes, in Arabic Abul-Walid-Muhammed-ibn-Ahmad Ibn Muhammed ibn Rushna, lived from 1120 to 1198 *anno Domini*. He was born at Cordova and spent his early life in the study of theology, jurisprudence, mathematics, medicine and philosophy, the usual curriculum for the student of Mohammedan Spain.

The prime years of his life were contemporary with the reign of the Almohades. The Almohades were one and the last of a succession of invading armies from the north coast of Africa. These Barbar peoples were from time to time united by the preeminence of a leader and after subjecting the Barbary coast invariably turned envious eyes across the narrow Straits of Gibraltar.

At this particular moment, about 1145 *anno Domini*, the Christians of the north, under the capable kingships of Fernando and Alfonso, served by such warriors as "Cid the Challenger," whose exploits have been made the basis for a hundred romantic verses and stories, were making serious inroads into the Moslem power of the south.

The Moors were softened by years of peace, security and prosperity and weakened by intertribal jealousy and feuds.

The time was not ripe for the final conquest by the Christians and the dour, fanatical Almohades of Africa seized the opportunity once more to achieve the conquest of southern Spain including the towns of Algericas, Seville, Malaga and Cordova. Their power lasted from 1145 to 1212, years corresponding to the best of the life of Averroes.

Although the strictly orthodox Mohammedan was opposed to liberal speculation and held that the Koran contained all the natural science necessary or expedient, it was nevertheless in Spain as further east the custom for the ruling Kaliph or Emir to encourage the growth of science and philosophy by active and liberal assistance of the student. The philosophic Vizier, Abubacer, introduced Averroes to the ruling prince, Yusef-al-Mansur, further testimony of his ability being proffered by his friend and colleague Avanzoar.

In 1169 Averroes was made Cadi of Seville and for twenty-five years held that and similar appointments at Cordova and Morocco.

Science and free thought were the prerogative of the wealthy and powerful and were also dependent upon the good will of the monarch.

The public and those expounders of the faith who played the rôle of priest, were intolerant towards the liberal sciences, holding that the Koran literally interpreted sufficed the needs of all.

These ignorant, fanatical murmurings burst into open rebellion in 1195 and Averroes lost all his honours and was banished. This storm, engendered of an ignorant mob whose psychology was understood and played upon by the reactionary Mullah, soon passed and Averroes was recalled to Morocco for a short term of honourable service until his death in 1199.

Judged by his writings, Averroes was a noble and upright man with a clear, exhaustive and dignified style of writing.

In Moslem history he had little place; his renown was local, ceased with his death and he initiated no school. His historic fame is due rather to the Christian schoolmen who admired his writings without envisaging the many expositors preceding him who had carried onward the teaching of the older civilizations.

He was an opponent and bitter critic of Avicenna whose licentious life was abhorrent to Averroes, the devout Mohammedan ascetic. He stands, however, far below Avicenna in attainment and historic importance.

Most of his writings are in manuscript in the Escorial Library. His philosophical works include "Commentaries on Aristotle," *"Destructio Destructionis," "De substantia Orbis," "De anima Beatitudine."* His larger commentaries included "Posterior Analytics," "Physics," *"De Caelo," "De Animo"* and "Metaphysics." A complete Latin edition appeared in Padua and Venice between 1480 and 1580.

Avenzoar.

Avenzoar, in Arabic Abu Merwan Abdal-Malik ibn Kuhr, was a contemporary of Averroes and flourished in Seville in the twelfth century after Christ. He came of a long line of physicians and his son achieved even greater local fame as a practitioner.

He belonged to the school of rationalists and dogmatists rather than to the empirics. He frequently in his writings protests against quackery and astrologers.

He possessed considerable knowledge of anatomy and has left an excellent account of his own illness of mediastinal abscess with a discussion on the differential diagnosis from pleurisy or pericarditis. For œsophageal obstruction he suggests the following methods of treatment: (i) Immersion of the patient in nutritive fluids. This attempt to encourage the absorption of nourishment *per cutem* he condemns; (ii) the use of a silver œsophageal tube; (iii) the use of nutrient enemata.

Both these last he advocates, given certain indications. With the exception of the doubtful procedure of gastrostomy and perhaps deep X ray therapy, the last nine hundred years have seen

strangely little advance in the treatment of obstruction of the gullet.

It is interesting to learn from his writings that in cultured Moslem Spain the physician, surgeon and apothecary were already well differentiated and specialized in their several branches of the healing art.

Avenzoar wrote only one book, entitled "Methods of Preparing Medicine and Diet," of which a Latin translation by Paravicius was printed in Venice in 1490.

Avenzoar seems to have been a fine type of court physician, enjoying an extensive practice, but finding time to maintain a scientific interest in his work and to commit to paper recollections and impressions of his times which are of great professional and historic interest.

One of the most striking features of the earlier known history of the world is the manner in which civilization after civilization arose apparently spontaneously without links the one with the other. There was no doubt some intercourse along the tracks of commerce and conquest, but the genesis and growth of contemporaneous and successive civilizations seem to have been in the main spontaneous. In the later years of their period there is no doubt that a free exchange of ideas took place between Assyria and Egypt, but their early growth was independent. The Assyrian cuneiform script has no relation to the pictorial symbolism of the Egyptian hieroglyphic. The barbaric inroads of the time came not merely to devastate and plunder, but to raze, destroy and annihilate, leaving no trace of former glories and carrying away no records for their own enlightenment.

As time passed there was a gradual aggregation of knowledge resulting in the progressive cultures of Phœnicia, Crete, Carthage, Greece and Rome which, although they destroyed at times, lent to and borrowed from one another until the civilization of the Mediterranean basin stood preeminent and alone.

It is to Greece that Europe owes so much, not only because of her standard of culture, to her wonderful advance in the arts and sciences, but also because her method of colonization preserved for a later age the philosophy, the liberal speculations, the natural science taught by the Hippocratic school and extended and promulgated by Galen, Celsus and Aristotle.

The wide-flung outposts of the great Alexandrian empire were not merely repressive garrisons, but were colonies which reproduced in miniature the civic and artistic life of the mother country. Throughout Alexander's eastern domains, in Asia Minor, in Trans-Caucasia, in Bokhara and Turkestan settlement after settlement of Greek soldiers and merchants promoted the cultivated life of the Ægean.

When finally the power of Greece broke and the scattered dynasties founded by the greater of Alexander's captains succumbed to the incessant internecine strife they engendered, there still remained a powerful leaven of learning right through the near east. For centuries after the collapse of Greece there remained in Asia Minor, Khiva, Merv, Iran and Persia cities which retained a generous measure of the legal, artistic and scientific erudition of the Hellenic civilization.

When Rome decayed, the last bulwark of the glories of the cultural progress of the Mediterranean basin was shattered and the obstacle to the impatient barbarian removed.

This central civilization, nurtured on the kindly shores of the inland sea, was protected only by the strong arms of its warriors. When those arms weakened, the way was open for the relentless savage foes at the circumference who had waited like wolves around a sheepfold for the moment when the broken fences should remain unrepaired.

Thus, in the early centuries of the Christian era there came successive inroads of destroyers; from the north came Vandal and Hun, Goth and Visigoth worshippers of Woden and Thor, savage and powerful, revengeful and ruthless; from the east came Tartar and Mongol, whilst from the south and east came a new power which was to prove more lasting than all.

Islam came from Arabia, a Semitic people after years of inferiority fired by missionary zeal for its new faith, came ultimately to a conquest greater than that of Persia, Greece or Rome.

The empires of Alexander and Constantine passed into the hands of this new Semitic power of the seventh century after Christ. To the Christian element it was not alien, for the new faith had its roots in Judaism, revered Moses as a prophet and honoured the Christ in like manner, recognizing, perhaps, what later Christians fail to admit, that "Allah is our God and Mohammed is His Prophet" and "Jehovah is our God and Christ is His Son" are differentiated more by language and environment than by fact.

The conquering Moslem was not a destroyer, in fact he was a tolerant victor who not only left the conquered some measure of dependent freedom, but also gave him strict if severe justice and received from him much that remained of the culture of the older powers.

The first followers of the prophet were antagonistic to the liberal philosophy of Aristotle and his followers, holding strictly to the literal interpretation of the Koran.

As the Moslem conquest of Asia Minor became consolidated, the hidden but undestroyed elements of Hellenic culture reappeared. As the courts of the Arabic Emirs and Kaliphs grew in importance and dignity, the fanatical adherence to the Koran became less and it was soon the fashion for the sovereign to surround himself with the intellectual giants of the time. This *intelligentsia* was composed mainly of Arabic-speaking Syrian or Persian descendants of the old people of the land, of whom Avicenna is one of the greatest examples, his mother

having been a native of Bokhara and his father a Persian.

Gradually this leaven of Hellenism spread until Aristotle was reverenced and studied from Central Asia to the Atlantic, giving rise to an Arabic literature of the different sciences, mathematics, astronomy, geography, zoology, chemistry, botany, grammar and logic, much more advanced than anything produced in the west at that time. Islam in its great sweep from the east, came into its most intimate contact with the west in the Spanish peninsula.

The condition of western Europe during the ninth and tenth centuries of the Christian era was deplorable; the protection of Rome withdrawn, it suffered from wave after wave of invaders who warred not only against the Romanized inhabitants, but also among themselves, producing such devastation and chaos that individuals and peoples spent their lives literally sword in hand for the bare defence of their homes and granaries.

The Roman adaptation of Grecian culture which had been grafted upon England had succumbed to the inroads of the Saxons who in turn stood at bay before the Dane until the victories of the Great Alfred led to a compromise resulting in an unstable peace which opened the way for the Norman conquest and the final consolidation, with fire and sword, of the English realm.

France and Germany suffered from continual invasion and warfare. The Tartar Huns led by Atilla, the "Scourge of God," swept over the terror-stricken lands threatening to obliterate all intellectual and moral progress. He was followed by the Franks, of the same stock as the Angles and Saxons, who had already begun the conquest of Britain. Less savage than the Huns, they came and conquered, withdrew, came again and settled. In the south-west of France the Visigoths, in alliance with Rome, had settled round Toulouse and from this base had invaded the Iberian peninsula; they were nominally Christians, but remained savage, ignorant and unprogressive. Their Christianity was much debased by pagan elements and they were unreceptive of the elements of culture left by Rome.

Such was the state of Europe when the cultivated, chivalrous and warlike Arab sprang across the Straits of Gibraltar from the northern shores of Africa to wrench from the Visigoth the greater part of his Spanish domain.

Here, in close contact with western Europe, this oriental Moslem people remained for eight centuries, bringing with them a very high standard of culture, a wide and appreciative knowledge of the science and art of Greece and an extensive scientific and philosophical Arabic literature to which Avicenna and his followers were great contributors.

Ultimately the rivalry of dynasties, fraternal strife, the degeneration which luxury and security so often produces, especially in eastern races, and a fanatical intolerance learnt from the Christians led to the destruction of Moslem Spain, the citizens of which were then subjected to persecution, slaughter and expulsion by the sincere but misguided Torquemada and the Holy Inquisition. Spanish lands which under Moslem rule were abundantly fertile and happy in their wonderful productiveness, supporting an ample population of contented and cultured people, are now barren or sparsely cultivated by an ignorant, superstitious and intolerant peasantry.

The collapse of Spain's greatness and her decline into a minor power are directly attributable to this destruction of her mediaeval *intelligentsia* which was composed of Moslem and Jew. During the lives of Averroes and Avenzoar the Moslem rule in Spain was still in the ascendant, although its decline was shortly to start.

The cities of Cordova, Malaga, Toledo, Granada and Seville were enjoying periods of prolonged peace and security during which the cultivation of the humanities progressed undisturbed. Encouraged by the enlightened rulers and only occasionally interfered with by the ignorance of a less tolerant Moslem priestcraft, the schoolmen continued to study, annotate and extend the wisdom of the Greek masters which had been successfully piloted through the upheavals which followed the break-up of the Greek and Roman civilizations, by such men as Avicenna. To these Mohammedan *savants* of Spain the mediaeval European universities of Venice, Pisa, Padua, Montpellier and Louvain owe the survival of the scientific achievements of the early Mediterranean civilizations which gave to the *Renaissance* a summation of knowledge that, with the end of the dark age, permitted the enormous and rapid advances of the fifteenth and sixteenth centuries.

The following description of the condition of life in Cordova at the time of Averroes will give some idea of the enlightenment and erudition that prevailed among the Moslems of Spain.

Cordova was a fortified town surrounded by massive and lofty stone walls and had very fine streets. It was spread out along ten miles of the banks of the Gaudalquiver which was spanned by a splendid bridge of seventeen arches. The banks of the river were bright with marble houses, mosques and gardens in which the rarest flowers and trees of all countries were carefully cultivated. The water by which these numerous gardens were supplied, was brought from the mountains where vestiges of hydraulic works may still be seen, by means of leaden pipes, through which it was conducted to numerous basins, some of gold or silver, others of inlaid brass and to lakes, reservoirs, tanks and fountains of Grecian marble.

The whole city was full of noble buildings, among which were counted more than fifty thousand houses of the aristocracy and official classes, more than a hundred thousand dwellings for the common people, seven hundred mosques and nine hundred public baths.

Of the intellectual life of the city the following quotation from the Arabian writer Makkary will convey some idea:

The inhabitants are famous for their courteous and polished manners, their superior intelligence, their exquisite taste and magnificence in their meals, dress and horses. There you would see doctors shining with all sorts of learning, lords distinguished by their virtues and generosity, warriors renowned for their expeditions into the country of the infidels and officers experienced in all kinds of warfare.

To Cordova came from all parts students eager to cultivate poetry, to study the sciences, to be instructed in divinity or law; so that it became the meeting place of the eminent in all matters, the abode of the learned and the place of resort for the studious; its interior was always filled with the eminent and noble of all countries, its literary men and soldiers continually vying with each other to gain renown and its precincts never ceased to be the arena of the distinguished, the racecourse of readers, the halting place of the noble and the repository of the true and virtuous. Cordova was to Andalusia what the head is to the body or what the breast is to the lion.

Oriental praise is apt to be somewhat high flown; but Cordova really deserved the praise that has been lavished upon it. When reading the above description we must remember that it relates to the tenth century, when our Saxon forebears were living in wooden huts and treading upon dirty straw, when the English language was in the making and such simple accomplishments as reading and writing were confined to a few monks.

Thus during the dark ages of European history the lamp of culture was kept brightly burning by the Moslem conquerors of southern Spain. Their tolerant, broad-minded eagerness to welcome all additions to their intellectual circle, their unimpeachable and scrupulous attention to personal cleanliness and hygiene and their generous and chivalrous conduct in war contrast sharply with the ignorant bigotry, the gross filth and the brutality of their Christian contemporaries.

The baths were an important feature in all Moslem towns, for among Mohammedans cleanliness is not "next to godliness," but an essential preparation for any act of prayer or devotion. While the mediaeval Christians forbade washing as a heathen custom and the monks and nuns boasted of their filthiness, insomuch that a lady saint recorded with pride the fact that up to the age of sixty she had never washed any part of her body except the tips of her fingers when she was going to take mass; while dirt was the characteristic of Christian sanctity, the Moslems were careful in the most minute particulars of cleanliness and dared not approach their God until their bodies were purified. When Spain had been at last restored to Christian rulers, Phillip the Second, the husband of our English Queen Mary, ordered the destruction of all public baths, on the ground that they were relics of infidelity.

The Moslem was originally willing and anxious to live in amity and concord side by side with the Christian, but the latter, when ascendant, practised such appalling cruelty upon the disciples of the prophet that the still existent feud between Islam and Christianity arose from a spirit of vengeance rather than one of religious intolerance. To the crass stupidity and shocking brutality of our mediaeval ancestors we today owe the recurrent Jeddahs which disturb the peace of England's Asiatic possessions.

The writer wishes to acknowledge his indebtedness for information gathered from a book entitled "The Moors in Spain," by Stanley Lane-Poole.

Reviews.

PHARMACO-DYNAMICS.

In his "Text Book of Biologic Assays" Dr. Paul S. Pittenger sets out to describe in detail the technique of the physiological standardization of such drugs as digitalis, adrenal and pituitary extracts, *cannabis indica*, ergot, squills and strophanthus.[1] The book is written by a pharmacist for pharmacists and others who are not familiar with advanced physiological methods, and in it is set out in full detail the exact technique required for the assay of each drug. The instructions given are clear and accurate and the methods of computing and comparing the results are explicitly described. The book is concerned solely with pharmaco-dynamics and does not deal with the therapeutic uses of the drugs. It should prove most useful not only to those to whom it is primarily addressed, but also to medical men who are concerned with the teaching of pharmacology and therapeutics.

Analytical Department.

"COCOMALT."

We have received samples of "Cocomalt" from the distributors in Australia and have been requested to examine the preparation. It is prepared by the Davis Baking Powder Company, Hoboken, New Jersey, United States of America. It is a greyish powder with a pleasant odour and a sweet chocolate taste. According to the pamphlet accompanying the tins, it is composed of eggs, cocoa, sugar, barley malt, milk minerals and milk proteins. It is to be taken with hot or cold milk. Three heaped teaspoonfuls of "Cocomalt" are emulsified in a tumbler full of cold milk by shaking. If the milk is hot, the "Cocomalt" (two heaped teaspoonfuls) is mixed with a small quantity of milk to make a paste and the remainder of the milk is then added. The makers further claim that the food value of milk is increased by 70% by adding the "Cocomalt." The published formula is as follows:

Fat	4·50%
Carbohydrates	74·51%
Protein	13·97%
Mineral matter	3·80%

The samples submitted to us were contained in hermetically closed tins. The tins and their contents were appetizingly clean in appearance and bore signs of careful handling. The analyses yielded the following composition:

Fat	2·80%
Carbohydrates	74·13%
Protein	14·87%
Mineral matter	3·10%
Moisture	5·10%

It will be noted that the fat content is 1·7% less, the carbohydrates 0·38% less and the protein 0·9% more than the published figures. It also appears that the samples contained 1·78% more moisture. One hundred grammes of "Cocomalt" are supposed to yield about 398 calories, while the samples subjected to analysis in Sydney would yield 381 calories. The differences are neither great nor important and may be due to some slight modifications for export overseas. Our figures mean that a glass of milk with "Cocomalt" would contain 108 calories more than the milk alone. The mixture is very pleasant to taste and the claim that children who cannot be persuaded to drink milk, take the mixture readily is probably justified. The preparation is an excellent one that may be prescribed with confidence.

[1] "A Text-book of Biologic Assays," by Paul S. Pittenger, Ph.G., Ph.C., Ph.M., Phar.D.; 1928. London: P. Blakiston's Son and Company. Post 8vo., pp. 396, with illustrations.

The Medical Journal of Australia

SATURDAY, MARCH 2, 1929.

The College of Surgeons of Australasia.

The second annual meeting of the Fellows of the College of Surgeons of Australasia will be held in Sydney from March 5 to March 8, 1929. The annual meeting proper will be spread over three evening meetings. On the first evening the formal business will be brought forward and then there will be debates on several motions of which notice has been given. Two of the motions are domestic and are of little interest to the medical profession as a whole. One motion to be presented by Dr. A. Norman McArthur will be followed closely by very many medical practitioners. He will ask the Fellows of the College of Surgeons of Australasia to define dichotomy or the splitting of fees. It will be remembered that it was Dr. McArthur who wrote a letter to this journal (see The Medical Journal of Australia, November 7, 1925, page 571) on this subject. The result of the publication of this letter was remarkable. For some months medical practitioners expressed their divergent views on the ethics of fee splitting. Some openly advocated this procedure and refused to admit that it was wrong either from the point of view of common morality or from the narrower aspect of medical ethics. The fate of this motion will be watched with more than usual attention. The College of Surgeons of Australasia started its career with a bible of good intentions. Its fellowship was to be granted exclusively to those practitioners who had undergone special training in surgery and had attained a high standard of surgical competence. In addition it was announced that this distinction would not be accorded to a medical practitioner unless his standard of conduct was considered satisfactory by the governing body of the College. By this it was assumed that the Council of the College would distinguish between the self-styled surgeon and the highly trained craftsman whose knowledge of surgery and surgical pathology and whose practice of surgery entitled him without question to a place in the front rank of surgeons. In upholding the ideals that the College had set up, we ventured in April, 1927, to assert that it would need courage to adhere to the principles without fear or favour on the part of those who were entrusted to carry out the objects of the College. The fellowship has been distributed to a very large number of medical practitioners. The acknowledged leaders in each capital city and particularly in each university city have their names included in the list. There are many junior men whose experience in surgical practice has been short. Some of these younger men have the complete confidence of their colleagues and no doubt their selection is justified both from the ethical and from the professional standards. It may be asked whether the Council is bold enough to refuse admission to those who have not yet produced sufficient evidence of their surgical fitness. The large numbers of Fellows awaken distrust. If the Council has failed in this respect, it will be extremely difficult, perhaps impossible, for it or its successor to remedy the defect.

The impression that fellowships are given too freely is disquieting not only from the point of view of surgical ability and knowledge, but also from that of medical ethics. The attention of our readers was drawn a few weeks ago by an anonymous correspondent to the display of letters on name plates. He mentions that F.C.S.A. appears on some, notwithstanding that this does not stand for a registrable qualification. It is not suggested that this display of imposing letters is in itself unethical. It is undignified and gives the impression that the owner of the name plate is prepared to advertise his attainments or good luck until or unless he is asked to give an account of his actions by a competent court of jurisdiction. This seems to be a sign that the letter rather than the spirit of a high standard of medical ethics is being followed.

The second motion of importance or rather the next two motions will tend to restore confidence if they are accepted. Sir George Syme will ask the Fellows to adopt a strong policy in regard to the higher qualifications in surgery. It is the intention

of the Council of the College of Surgeons to ask our universities to make the degree of master of surgery analogous to that of doctor of medicine. Sir George Syme wishes to give a lead to the examining bodies in the medical schools in Australia and New Zealand in regard to the standard of knowledge that is required for a higher degree. Any expedient that entails a raising of the learning, technical training and clinical ability of surgeons, should be welcomed. We hope that the second annual meeting will disclose evidence that the Council has not departed from the high ideals it set itself but two years ago and that it will have sufficient courage and daring to carry its principles through despite the consequences.

Current Comment.

IMMUNITY TO DIPHTHERIA.

Since the introduction of the Schick test a great deal of work has been done on the subject of immunity to diphtheria. This has been by no means simple. The question of the carrier and that of epidemics present considerable difficulty. It is recognized that the infecting agent, the resistance of the individual and the source of infection are the factors in the process to be considered. Among those who have investigated immunity to diphtheria is Sheldon F. Dudley, of the Naval Medical Service. In 1923 he made a lengthy report to the Medical Research Council on the subject of diphtheria, scarlet fever and immunity. A special abstract of this report was published in these pages on August 11, 1923. In this report he argued that failure to react to the Schick test necessarily means that the individual has been in contact with diphtheria bacilli at one time or another. He was inclined to discard the doctrine that antitoxin in blood or tissues is an essential part of immunity, because otherwise he found it difficult to explain the immunity of the carrier who harbours bacilli capable of infecting others, while he himself does not react to the Schick test. He thought that acquired immunity probably depends on the number, size and separation in time of the sub-infective doses of diphtheria bacilli. If the amount of infection received exceeds a certain amount within a given time, Dudley holds that the recipient who fails to react to the Schick test, that is who is immune, becomes a carrier; if he reacts to the test, if he is susceptible, he becomes infected. In regard to epidemic immunity he concluded that coincident with an epidemic of diphtheria there is an epidemic of immunization. According to this conception a more rapid infection induces a greater concentration of infection and consequently a more rapid dissemination of submaximal doses of the infecting agent. These doses immunize certain individuals without producing clinical manifestations of the disease.

Attention should also be drawn to Dudley's paper, read before the second session of the Australasian Medical Congress (British Medical Association) at Dunedin, in which he discussed the possibility of foretelling epidemics of diphtheria.

Dudley has attacked this question again.[1] He refers to his earlier work and points out that a great deal depends on the truth of the hypothesis that failure to react to the Schick test denotes previous exposure to diphtherial antigens. As far as he knows it has not been possible to demonstrate the truth of this view and he has attempted to do so. He has carried out his work at a school of about one thousand boys, a school in which diphtheria was endemic for over three years. The subject is considered under two headings: natural stimulation of human diphtheria antitoxin and artificial stimulation. The discussion on the first of these is illustrated by a comprehensive graph. Boys to the number of 906 were submitted to the Schick test in January, 1928. Of the new boys entering school at this time only 32% were immune as judged by the Schick test. Dudley points out that the percentage of susceptibles according to this figure is exceptionally high. The average percentage of susceptibles in six batches of new boys who were tested between 1921 and 1928, was 53. In order to avoid complications the figure 32% has been accepted for every term during the three year period. This is obviously an arbitrary procedure, but while it would have an undoubted influence on the figures for each term, it would not affect greatly those for the whole period. The number of fresh infections arising in each term is shown in the graph and the immunity acquired by the pupils while they were in the school. It is thus clear that the decline in susceptibility was gradual and continuous. Dudley holds that this is because diphtheria was endemic in the school during the whole of the period. He points out that the correlation between herd immunity and the amount of bacterial contact obtained in this way by testing at the same time different groups of persons with varied experience, is in reality only circumstantial evidence that the excess of immune persons in the senior samples acquired their immunity while at the school. He refers to more direct evidence that has been obtained at Greenwich and gives as an example eighty-three boys who were susceptible to diphtheria (they reacted to the Schick test) in 1922. These boys were retested exactly two years later; forty-eight of them gave a different reaction to the test and were found to be immune. It is obvious that this herd immunity is not obtained without the occurrence of symptoms. It was calculated at Greenwich during six years that one boy contracted diphtheria while three became immunized. This is, of course, an example of what occurs in the community at large, but in a less concentrated way, if such an expression may be used.

[1] *The British Journal of Experimental Pathology*, December, 1928.

Under the heading of artificial stimulation of human diphtheria antitoxin Dudley describes the active immunization of 209 boys from among 243, the number of those who were found to be susceptible among the 906 tested in January, 1928. After the receipt of diphtheria antigen (it is not necessary to give details of the different antigens used) the boys were tested by the Schick test at intervals of three, six, twelve and twenty-four weeks. The boys were divided into three groups: those newly entered, those who had been at school less than a year and those who had been more than a year in residence. It was found that three months after the first inoculation of diphtheria prophylactic 41% of the new boys still gave a positive response to the test, in other words were susceptible, while only 13% of the most senior group responded in like manner. In six months 82% of the most junior group had become immune, but by this time 97% of the boys who had been more than a year at school had acquired an active immunity. The results are set out in tables in much more detail. These figures are regarded as being a confirmation of the well known observation that the higher the proportion of immune persons in a community, the easier it will be to immunize the susceptible persons in that community. This may be explained by the view that the high proportion of immune persons indicates that the community as a whole has been in contact with infective material and that those who are not immune, have nevertheless stored up a certain supply of antibody, they are on the high road to immunity and will not require such an amount of artificial stimulation as they would have needed had they not received small doses of infective material.

Dudley goes on to attack the old view that latent immunization in diphtheria is a physiological function of age. He shows that "immunity is experience, not age." He describes an imaginary group of children from the age of one to the time when they would come into an environment similar to that described at the Greenwich school. In the average English environment the rate of immunization is 1·6% between the ages of one and twelve. It becomes 12% per term in the Greenwich school and this rate was increased to 80% per term by the artificial stimulus of injected diphtheria prophylactics. This means that laboratory injections are fifty times as powerful in producing immunity as the natural influences of the average English environment and seven times as powerful as a specific environment, such as that described by him, in which diphtheria has been endemic for some years. At the same time the immunization by a diphtherial environment is much slower than artificial methods and is accompanied by a heavy toll in clinical disease. These figures may be used as a powerful argument in favour of toxin-antitoxin administration for active immunization against diphtheria.

In conclusion it must be noted that Dudley's article is written around the subject of circulating human diphtheria antitoxin. It is evident that, although he was previously inclined to reject the doctrine that antitoxin in the tissues or in the blood is an essential part of immunity, he has not yet done so. It appears that in the infections discussed by him circulating antitoxin has played the leading part. Circulating antitoxin, however, does not explain all forms of immunity. In this connexion it is well to call to mind the work of Peterson and Müller, discussed in these pages a fortnight ago, on the influence of the sympathetic nervous system on susceptibility to infection. It appears to be more than likely that this mechanism offers an explanation for the immunity exhibited by some persons.

TUMOUR OF THE PANCREAS AND HYPOGLYCÆMIA.

In 1927 Wilder, Allan Power and Robertson described a malignant tumour of the pancreas which originated in the islands of Langerhans. In our issue of September 8, 1928, attention was drawn to this and to another tumour described by Thalhimer and Murphy. In both instances the patient suffered from hypoglycæmia. The tumour of Wilder and his associates was frankly malignant; Thalhimer and Murphy found it difficult to determine whether their tumour should be classified as a carcinoma of low grade malignancy or as an adenoma. Another interesting report has been made by W. U. McClenahan and G. W. Norris.[1] Their patient, a man of forty-one years of age, died of bronchopneumonia and in coma. He had suffered for some time from hypoglycæmia. At *post mortem* examination a small adenoma of the pancreas was found. It measured fifteen by seven by sixteen millimetres, was surrounded by a delicate fibrous capsule and its cells were judged from the morphological appearance to be of the β type. There was an increase in the number and size of islands in the adjacent pancreatic tissue. The liver, adrenals and pituitary gland were found to be normal. McClenahan and Norris raise the question as to whether the tumour was an adenoma or a greatly hypertrophied island. The conformation of the tumour suggests the former and the structure of the surrounding tissue the latter. Several authors have described hypertrophied islands which from size alone might be regarded as adenomata. In Wilder's patient increased carbohydrate intake was made necessary by the hyperinsulinism; the clinical history of this patient supports that view. At the same time McClenahan and Norris point out that hypertrophy and adenomata of the islands of Langerhans may occur without disturbance of the carbohydrate metabolism. They suggest the existence of a new disease entity. This is really a minor consideration. What needs to be determined is the original cause of the hypertrophy of the islet cells. Possibly the tumour under discussion and those previously described in these pages were different stages of the same process.

[1] *The American Journal of the Medical Sciences*, January, 1929.

Abstracts from Current Medical Literature.

RADIOLOGY.

Hydatid Infection.

C. C. ANDERSON contributes a paper on the radiological diagnosis of hydatid infection (*British Journal of Radiology*, November, 1928). This disease may occur in any part of the body, but liver and lung hydatids are the most common. Usually the cyst appears as an ovoid shadow, but hydatid disease takes the line of least resistance and where a cyst impinges on a dense structure it becomes flattened. The pericyst varies considerably in density. The ectocyst and contents manifest uniform density. Calcification occurs in the ectocyst and pericyst when the hydatid is dead. Infection occurs by the alimentary canal and the theory of inspiration in pulmonary cysts is totally discredited. In hydatid disease of the upper part of the liver there is elevation and irregularity of the upper surface. In hydatid disease below the liver it may be possible to demonstrate the outline of the cyst by noting displacement of the abdominal organs after an opaque meal has been given. Owing to the ease with which cysts may rupture, pneumo-peritoneum presents special danger. In the chest the cyst is generally perfectly round. It generally lies posteriorly in the lower lobe. Hydatid disease of the lung is frequently diagnosed and treated as tuberculosis, as the only signs may be localized dulness with hæmoptysis. Needling is dangerous and may lead to rupture of the cyst.

Lung Collapse in Tuberculosis.

J. SPROULL contributes a paper on collapse of the lung occurring in pulmonary tuberculosis (*American Journal of Roentgenology*, November, 1928). Such collapse has rarely been reported in adults, but is well known in children. The changes usually seen are narrowing of the intercostal spaces on the affected side, elevation of the diaphragm or inability to visualize it, increase in density corresponding to the area of the lung collapsed, displacement of the heart, mediastinum and trachea towards the affected side. Bronchial stenosis is the essential causative factor. The author thinks that glandular pressure is the cause of the stenosis.

Benign Duodenal Tumours.

R. GOLDEN reports two cases of non-malignant tumours of the duodenum (*American Journal of Roentgenology*, November, 1928). Such tumours are seldom seen and are much rarer than in the stomach or rest of the intestinal tract. The author gives a review of the literature on this condition. The first patient complained of epigastric pain three to four hours after meals with burning eructations and belching of gas. Pain often occurred at night and was relieved by foods. He had lost 3·6 kilograms (eight pounds) in two months. Radiographically a rounded defect could be made out in the duodenal cap. This could be moved, but not obliterated and a diagnosis of polypus was made. Repetition of the examination in three weeks revealed a similar appearance. Operation confirmed the finding and the pathologist reported "adenoma of the duodenum." The second patient complained of distension after food with eructations; vomiting gave relief. X ray examination revealed spasm of the distal part of the stomach and the duodenum could never be demonstrated. Operation revealed a large tumour mass in a dilated duodenal bulb. The pathological report was "duodenal polypus composed of mucous cells."

Diaphragmatic Hernia.

L. T. LE WALD draws attention to the infrequency of traumatic diaphragmatic hernia as compared with congenital diaphragmatic hernia (*American Journal of Roentgenology*, November, 1928). Extensive defects up to absence of half the diaphragm are common and may cause little disability to the individual. The author classifies diaphragmatic lesions as follows: (i) Absence of left half of diaphragm, (ii) "thoracic stomach," (iii) eventration of the diaphragm, (iv) congenital hernia, (v) acquired hernia. In regard to absence of the left half of the diaphragm the condition can be diagnosed radiologically and is especially well seen in lateral views; surgery is contraindicated in this condition. "Thoracic stomach" occurs with a well formed diaphragm and the stomach is completely in the chest. The œsophagus is short and the duodenum or pyloric end of the stomach passes through the diaphragm. Surgery is indicated only when gastric stasis or pyloric stenosis is present. Eventration of the diaphragm usually occurs on the left side and the outline of the diaphragm may be seen especially in lateral and oblique views. Congenital hernia may occur with or without a sac and is easily relieved by surgical operation. Acquired hernia may occur through the œsophageal opening.

"Lipiodol" in Chest Diagnosis.

B. H. NICHOLS draws attention to the usefulness of "Lipiodol" in the demonstration of chest lesions (*Radiology*, January, 1929). Several methods of introduction are used by different workers. It may be introduced through the crico-thyreoid membrane by syringe, through the trachea below the thyreoid gland isthmus, through the bronchoscope or by the transglottic route by means of the laryngeal syringe or by the laryngeal and tracheal route by means of a catheter. Whatever route is chosen, care must be taken not to inject too large a quantity, as over-injection gives a false appearance of lung abscess. If the catheter is used, it is possible to pass it outside the X ray room and then to allow the "Lipiodol" to trickle slowly into the lung under the fluoroscope, the patient being tilted towards the affected side. If the lesion is in an upper lobe, the patient is inverted somewhat. "Lipiodol" may remain in the hilar glands for a long time after injection and gives the appearance of calcified areas. In the presence of abscess the bronchoscope should be used, as it may be possible to empty the abscess through the bronchoscope. In hilar lesions the author considers that bismuth subcarbonate insufflation will outline cavities and bronchi. "Lipiodol" injections should not be made in patients with known pulmonary tuberculosis. Hyperthyreoidism is also a contra-indication if the patient has received iodine treatment; cardiac disease and elevation of temperature also call for extreme caution in the use of this method.

Prognosis in Tuberculous Spines.

R. K. GHORMLEY AND J. I. BRADLEY discuss the X ray appearances in tuberculous spines in children (*Journal of Bone and Joint Surgery*, October, 1928). Skiagrams reveal various changes. There may be increase or decrease in calcification which must not be confused with reappearance of trabeculæ, as seen in the healing process, and is a valuable sign of repair. Progressive destruction of bone indicates an advancing lesion. Fusion between partially destroyed bodies may take place and is a favourable sign as far as permanent arrest of the disease is concerned. X ray examination should demonstrate abscess when present. Decrease in size of an abscess is a good sign, while increase in size is a bad one. Increase in calcification of an abscess is of little significance, but it indicates a tendency towards improvement. Abscesses with secondary infection show little tendency to calcify. Paravertebral abscesses in Pott's disease of the dorsal spine are dangerous in that they cause a wider destruction than the original lesion.

PHYSICAL THERAPY.

Lichen Ruber Planus.

S. NEUMARK AND A. KRYNSKI (*Strahlentherapie*, 1928, *Band* XXV) discuss the treatment of *lichen ruber planus* by Röntgen irradiation of the spinal cord and sympathetic ganglia. They report eight cases in one of which previous local treatment with salves and Röntgen rays had been carried out without much improvement. It was decided to test the value of Röntgen treatment of the spinal cord and sympathetic ganglia. Only the interscapular and lumbar regions were exposed to small doses administered a few times at intervals of four weeks. The radiation technique was twenty-eight to thirty centimetres spark gap, 2·5 milliampères, twenty-five to thirty centimetres anticathode skin distance, single dose three to six Holzknecht units, filtered through three to four millimetres of aluminium. In some cases only the upper and lower segments were

exposed according to the localization of the disease process. The position of the Röntgen tube was perpendicular to the spinous processes. The eight cases are briefly reported. The treatment resulted in complete cure in three instances, considerable improvement in three. In cases of *lichen planus corneus* and verrucosis of the leg there was no noticeable improvement. It may be stated that irradiation of the spinal cord and sympathetic ganglia is successful in general subacute exanthems.

Röntgen Injury in Germany.

HEINZ LOSSEN (*Acta Radiologica, Band* VIII, 1927) makes a report of accidents and injuries in Röntgen establishments in Germany. He deals with 183 cases, four of which were not truly Röntgen injuries. Six were chronic injuries, 53 were incurred during diagnostic procedures, 27 during Röntgenoscopy, 15 in Röntgenography and eight in a combination of the two. One hundred and twenty patients were injured in therapeutic procedures, 58 of these during superficial and 62 during deep therapy. In a number of instances the combination of chronic external irritation may have been responsible for the appearance of late Röntgen injury. In some there was evidence of cumulation of repeated dosage or overlapping of fields, incorrect dosimetry readings or improper after treatment. From the analysis the conclusion is reached that the contraindication to Röntgen irradiation is absolute when active Röntgen injury exists and is very definite, though not absolute, when inactive Röntgen injury exists, in infancy, childhood, pregnancy, in diseases of the skin (eczema, hyperidrosis, gout, Addison's disease, Graves's disease), in infections, renal disease, marasmus, after treatment with iodine, quinine, "Salvarsan," adrenalin, irritating salves, in hyperæmia with stasis, after radiotherapy with mesothorium, radium *et cetera* or radiation from sunlight, ultraviolet light *et cetera*.

Ultra-violet Rays and Phosphoric Acid in Blood Serum.

C. SONNE AND P. SCHULTZER (*Acta Radiologica*, Special Number, *Band* VII) discuss the action of ultra-violet rays on the phosphoric acid in the blood serum. They found that during the course of an intense administration of ultra-violet light to normal adult and growing rabbits by means of the quartz lamp, there is an increase in the soluble phosphoric acid in the blood serum. This begins about one hour after irradiation and reaches its maximum two hours later still. In several cases it reached 80%. No characteristic modification of the calcium content of the serum was found. After intense radiation the epilated skin assumes various colours when treated with a few drops of red brown cresol dissolved in alcohol. When the skin was in a state of intense œdema as a result of the irradiation, the phosphoric acid content of the liquid œdema was determined and found to be two to five times as great as in the serum of the same animal. No finding was made which would indicate that direct irradiation would have the property of accompanying the phosphates of the organic phosphoric compounds of the blood. It has not been possible to find the formation of any substance during irradiation of a serum which can increase the phosphoric acid of the serum.

Irradiation in Heine-Medin Disease.

G. BERGHINZ (*British Journal of Radiology*, May, 1928) states that Heine-Medin disease is subject to great improvement if radiotherapy be adopted. The treatment must be started early in the acute post-febrile stage before paralysis has become stabilized and before there are irreparable deformities, that is, the treatment must be begun when the acute inflammation in the cord has subsided. Complete cure occurs in about 15% of cases and improvement in 75%. Reflexes return, atrophy does not occur and the usual atrophic and circulatory changes do not develope. The technique adopted is to irradiate the cord obliquely from the back with a series of treatments at monthly intervals. The series consists of three exposures totalling 600 Röntgen units delivered above six millimetres of aluminium. As the age of the child increases, the dose increases up to 1,000 Röntgen units (the equivalent of five Holzknecht units). These doses are followed by anorexia, nausea and even vomiting, especially when the dorso-lumbar region is exposed.

Röntgen Irradiation of Cholesterin.

THE effect of Röntgen irradiation in producing changes in cholesterin *in vitro* is discussed by Bachen and R. P. McFate (*Strahlentherapie*, 1927, *Band* XXV). They point out that cholesterols are broken down only in solutions of chloroform and carbon tetrachloride. The effect is an indirect one through the formation of an oxidizing substance, presumably oxyacids of chlorine. The object of the experiment was to determine the possibility of utilizing the destruction of cholesterin as a means of measuring Röntgen dosage. The results show that the above reactions cannot be employed for this purpose in the organism.

The Erythema Dose.

K. W. HAUSSER AND E. SCHLECHTER (*Strahlentherapie*, 1928, *Band* XXVII) state that the erythema reaction as a measure dose has been criticized by a number of investigators. They undertook experiments with ultra-violet light of different wave lengths in order to study this problem. They found that the response of the skin with an erythema depends considerably upon the wave length used. It appears, for instance, that a dose given with 3,130 Ångström units, if increased by 20%, causes four times as intense a reaction, while with 2,540 Ångström units four times the energy applied gives only twice as intense an erythema. It is assumed that Röntgen rays act in the same manner as any other set of rays of a wave length of 3,130 Ångström units. The erythema reaction can, therefore, be used as a biological dose unit. When Röntgen rays of long wave length are used, a new factor enters into the problem. They act as short ultra-violet rays, because ten times the energy applied to the skin will lead to only four times as intense a reaction. For this special part of the spectrum the erythema unit is not suitable.

The Physics of Radium Therapy.

W. FRIEDRICH (*Strahlentherapie*, 1927, *Band* XXVI) presents a general discussion in which it is shown that in radium therapy somewhat different physical conditions are involved than in Röntgen therapy. It is emphasized that in order to obtain successful application of radioactive rays for curative purposes, as thorough a study of the physical as of the clinical conditions is necessary. A description is given of the sources of the radiations, their nature and their measurements. The penetrability of the hard γ rays of radium *C* and thorium *C* surpass by far the hardest Röntgen rays in practical use. Half value layers of fifteen millimetres of lead or sixteen centimetres of tissue have been measured. The measurement of γ radiation for establishment of dosage is of considerable importance. The difficulties in accurate measurement are considerable and if they are to be avoided careful technique is necessary. Measurements of dose distribution by the various proposed physico-technical procedures are not all in agreement. At any rate, they furnish a basis for the therapeutic use of radium preparations in a more or less reproducible manner. Various forms of radium applicators are described. It would be of great interest and importance to obtain some connexion between the radium dose and the standardized dose of Röntgen therapy in terms of the *R* unit. In this connexion a good deal of work has still to be done. It is assumed that a dose of hard filtered Röntgen rays (about 100 Röntgen units, including recoil scattering) produces the same reaction on the skin as do 560 milligramme-hours of radium at a distance of one centimetre filtered through 1·5 millimetres of brass and 3·0 millimetres of celluloid to retain β radiation, a uniform basis of dosimetry may be established. This particular value is obtained from researches of Opitz and Friedrich. When combined Röntgen and radium therapy is employed, a uniform method of dose measurement is of great importance. In radium therapy it may be necessary at times to take into consideration the secondary radiation produced, particularly by the heavy metal filters. To eliminate this factor, if it should prove of significance, it would be necessary to interpose a light metal filter like aluminium such as is done in Röntgen therapy.

British Medical Association News.

SCIENTIFIC.

A MEETING OF THE NEW SOUTH WALES BRANCH OF THE BRITISH MEDICAL ASSOCIATION TOGETHER WITH THE SECTION OF ORTHOPÆDICS, THE SECTION OF SURGERY AND THE SECTION OF PÆDIATRICS was held at the B.M.A. Building, 30-34, Elizabeth Street, Sydney, on October 25, 1928, DR. J. E. V. BARLING, the President, in the chair.

Osteo-Myelitis.

DR. R. B. WADE read a paper, "Acute Osteo-myelitis in Children" (see page 264), and illustrated it with lantern slides.

DR. W. VICKERS read a paper entitled: "Acute Osteo-myelitis" (see page 268). This paper was also illustrated by lantern slides.

DR. J. COLVIN STOREY read a paper entitled: "Osteo-myelitis of Local Infection" (see page 270).

DR. C. E. CORLETTE said that the Carrel-Dakin treatment should be employed if a wound was suspected of being dirty. He had seen this treatment save many lives, but he was sorry to say that the technique had become far less used since the war. He pleaded for a revival of this admirable treatment. He maintained that it shortened the period of disability and led to an apyrexial convalescence. He referred to a patient who had been brought down from the country suffering from a supra-malleolar fracture with the tibia protruding. This man had been treated by the Carrel-Dakin method and at the time of the meeting was walking about with a useful foot.

DR. P. L. HIPSLEY agreed with Dr. Corlette in regard to the value of the Carrel-Dakin treatment. He referred to the case of a patient he had seen a few years previously after a motor car accident. The knee had been laid open and the patella broken into small fragments. Carrel-Dakin irrigation had been applied; the wound had healed by first intention and the patient had done very well. He was strongly of opinion that masterly inactivity in osteo-myelitis frequently led to disastrous results. He had seen this in some patients at the Children's Hospital. When Dr. Storey had failed to find any pus, he had probably missed a small focus. He was convinced that the results would have been better in these conditions had he opened up the bone. He had come to the conclusion that it was very important to spend a considerable amount of time and trouble in seeking for the lesion before the patient was put under an anæsthetic. The patient had a better chance if the site of the lesion were known. He was satisfied that if definite symptoms were present there was pus to be found somewhere.

DR. H. R. G. POATE congratulated Dr. Wade, Dr. Vickers and Dr. Storey. They were justified in looking to the surgeons at the Children's Hospital for guidance in regard to osteo-myelitis. Their practice should be the basis on which other surgeons relied. He had been surprised to learn that there was a 15% mortality and that septicæmia occurred in 10% of the patients. It was a high mortality rate. He referred to a discussion which had taken place at the Royal Prince Alfred Hospital in the treatment of a patient with osteo-myelitis. He had determined that he would open up the bone and deal directly with the lesion, but had been challenged by a student as to the correctness of such a course as compared with a simple drilling of the bone. He was glad to learn that Dr. Wade advocated this treatment. At all times he hesitated before removing the diaphysis and made an endeavour to save it by drainage. Dr. Poate referred in some detail to the manner in which first aid was carried out by those in charge of the New South Wales ambulances. Many of the ambulance men were insufficiently trained for the service they had to render in street accidents. He was convinced that it was a very dangerous thing to interfere with some fractured limbs. In dealing with compound fractures he held that much harm was done by closing the wound. He preferred to take a knife, to open it up well and to keep it open. Many surgeons were frightened to establish drainage. Dr. Poate agreed with Dr. Corlette in regard to the value of the Carrel-Dakin treatment. After the acute stage was over he used balsam of Peru and castor oil as a dressing. This kept the pus down, prevented infection and contributed to the comfort of the patient in that the dressing needed changing only every twenty-four to forty-eight hours.

DR. N. D. ROYLE spoke enthusiastically of the value of treatment by diathermy for osteo-myelitis. Diathermy was particularly valuable as a preliminary treatment in that it caused the pain to disappear and hastened healing. He approved of the Carrel-Dakin treatment and held the opinion that the plaster of Paris splint was the most effective on which to place the limb.

DR. HARVEY SUTTON, O.B.E., considered that the remarks of Dr. Poate in connexion with the incompetence of some of the ambulance men were very important. Motor car accidents were increasing. He thought that the Director-General of Public Health of New South Wales should be approached and should be asked to take the steps necessary to insure competent training and work. Dr. Sutton stated that he had noted that fatal accidents were at least two and a half times more common among boys than among girls and that the peak of incidence corresponded to the school holidays. Of all deaths of boys at the school ages accidental violence accounted for about 30%.

DR. C. NIGEL SMITH said that there was a need for educating the public. The public should know that pains in limbs were just as important as pains in the abdomen and that medical advice should be sought whenever they were severe. Osteo-myelitis led to prolonged suffering and disability. The public was aware that it was necessary to make an early diagnosis and to institute early treatment in cases of abdominal pain and therefore regarded it as an indication to send for the doctor. The same should obtain in regard to pain in the limbs. Dr. Smith was convinced that many patients with osteo-myelitis suffered from the fact that the diagnosis was not made earlier. As a rule it was regarded as rheumatism or growing pains until the condition was so far advanced that the diagnosis was obvious and the prognosis bad.

DR. D. J. GLISSAN stated that he had learnt very much from Dr. Wade and Dr. Vickers. He thought that the teaching of the staff of the Children's Hospital had been summarized very clearly and concisely. It was valuable to have standards such as they had laid down to adopt. He wished to mention the question of periostitis as a separate entity. He understod that primary infective periostitis was a rare thing. He had seen a few patients with what seemed to be this condition. At times the condition did not appear to fit into any known category. He referred to the case of a growing boy who had complained of having definite pains in his thigh. On examination a large, firm mass was felt in the thigh like an osteosarcoma. A skiagram had been taken, but this did not disclose very much beyond some irregularity of the periosteum. The boy had been placed in bed with complete rest and the limb had been kept under observation. The swelling had persisted and there had been irregular tenderness. An exploratory operation had been performed. All that had been found was very much thickened periosteum. This had been incised, but had to be resewn at several points on account of the profuse hæmorrhage. Ultimately a large fluctuating swelling had formed containing much tissue *débris*, but no pus. On culture no organisms had been found. It had been drained and had become infected from without. He was inclined to the opinion that the condition was a primary periostitis. Another patient, a young girl, had complained of pain and stiffness of her thigh muscles. A fluctuant swelling had been found in the thigh. He had opened this swelling and had evacuated a large quantity of blood-stained fluid and two minute spicules of bone, but no pus. On culture *Staphylococcus aureus* had been recovered. Nothing abnormal was seen in the skiagram, except the two tiny spicules of bone. He had sewn the wound up to prevent infection from without and the patient had done well. Was this a case of superficial osteo-myelitis or a primary periostitis? He agreed with Dr. Corlette in regard to the treatment by the Carrel-Dakin method. He thought that the reason it had been neglected was that the nurses and resident medical officers had found it difficult to carry out and in this way it had become unpopular. He thought that surgeons should give minute directions in regard to the

technique and should see that these were carried out faithfully. He had seen an attempt to carry out this technique with an ordinary catheter.

DR. P. D. BRADDON spoke of specimens discovered during routine *post mortem* examinations at the London Hospital. In several cases in children dead of diseases other than acute osteo-myelitis small hæmatomata were discovered close to the epiphyseal line and it was thought that such blood clots would be a *locus minoris resistentiæ* and an eminently suitable nidus to give a start to any organisms that happened to be circulating. These hæmatomata would be the result of strains during life applied to the weak area referred to by Dr. Wade.

In his reply Dr. R. B. Wade said that he had expected to meet more opposition to his advocacy of conservatism. However, the treatment of osteo-myelitis had undergone very material change during late years. It used to be the practice to gouge out the whole of the medulla. Then the less radical treatment of guttering had been introduced, but he was convinced that the practice of merely drilling an opening through the cortex or removing the cortex from which the periosteum had been raised would come more into use. Dr. Wade did not claim that his method of treatment represented the teaching at the Children's Hospital. He did not agree with Dr. Vickers that the surgeon should go on until he found pus, for in the early cases no pus was present. When pus was exuded under the periosteum, he removed some of the cortical bone, not for drainage, but to diminish the amount of sequestration. If pus had not lifted up the periosteum, he was usually content to make a small opening through the cortical bone to assist the drainage through the Haversian system. In reply to Dr. Vickers he expressed the opinion that diaphysectomy was not a suitable operation. In his opinion the Carrel-Dakin treatment had fallen into disuse because there had been a failure to follow the correct technique. He regarded rest as of the utmost importance and advocated the application of splints as early as possible. Apart from alleviating pain this had the effect of relieving subsequent deformity.

DR. W. VICKERS in reply stated that he was not entirely in agreement with Dr. Wade. The temperature nearly always dropped after incision and drilling the bone. He referred to the case of a boy with osteo-myelitis in whom insufficient drainage had been established. Compact bone had been gouged away to the extent of one-third of the circumference. The medulla had not been touched. He thought that the Carrel-Dakin treatment was very valuable in the early stages and that balsam of Peru and castor oil were useful later. He maintained that early diagnosis was of the utmost importance. Complaint of tenderness, if definite, and a raised temperature were sufficient to justify the diagnosis.

DR. STOREY said that he knew that in offering his rather novel suggestion he would bring a coal of fire upon his head, but the speakers had not convinced him. They had attacked the question of early operation; he would therefore reply to many at once on this point, or try to. Some one had said that he had seen the results of waiting, but he had not seen the result of waiting under the conditions suggested by him (Dr. Storey). The neglected patients that came to hospital after weeks of wallowing in their own pus, so to speak, were not what he would desire. He referred to patients with a very early acute condition before pus was formed. Moreover, the neglected patients had not been put at rest by adequate splinting. The mere existence of these conditions was evidence of possible life without early operation. He confessed that if he met a patient that night, he would probably do very much what Dr. Wade had described, but he would be by no means sure that he was doing the right thing for the patient. He did not wish to be misunderstood. No one would gainsay the wisdom of operating on those patients in whom the diagnosis was quite obvious, but they should be very careful that they did not turn the tables against the patient by adding injury to his already damaged body. He was quite sure that prolonged and extensive operation for an acute condition was very bad surgery. Dr. Corlette had mentioned the Carrel-Dakin treatment. He agreed with him that it was an excellent method, but he did not think that the choice of method mattered so much as its intelligent application. The chief thing was adequate drainage. He confessed to a predilection for the bismuth-iodoform-paraffin paste method. He remembered a soldier who had received a severe bomb wound above the ankle while he was incubating for typhoid fever. He had been treated by thorough washing with 5% solution of carbolic acid and then with saline solution and the leg was splinted on a suspended back iron splint. He had gone through the course of the typhoid fever and his leg had given no trouble. Dr. Hipsley had mentioned the importance of local tenderness. They all appreciated this point; it was the only diagnostic method of localization. X ray examination was useless in the acute stage; it only subjected the patient to needless worry. Even in the chronic stages the radiographer might mislead the surgeon. He had seen two patients pronounced by a most experienced radiographer to be suffering from malignant disease. The condition had turned out to be inflammatory. He bowed to the extensive experience of the men at the Children's Hospital, but general surgeons saw many patients and he thought that they knew where to look for pus. The point was that they must not do harm to the patient just for the satisfaction of finding pus or rather of excluding its possible presence. They were dealing with a general infection. Appendicitis had been mentioned by one speaker. There was no analogy whatever between the two conditions. In any case probably 90% of all patients with appendicitis would settle down unoperated on, but he would not advocate this method. The patient might be one of the 10% in whom the abscess burst into the peritoneal cavity. The man who could tell what an appendix was like from outside the abdomen, was a fool or a liar. Even in appendicitis, harm had been done by too extensive operation. Dr. Glissan had mentioned an interesting case where broken down *débris* came out of the wound some time after his exploration. He had a similar case. Both were cases of chronic osteo-myelitis, another piece of evidence that all patients who were not subjected to operation did not come to harm. His patient had come from the country and every one, including the radiographer, thought he had a sarcoma. The wish having been father to the thought, he had hoped that it was inflammatory. Sir Alexander MacCormick had very kindly come to his assistance and had gone to the hospital to encourage him and to assist at the operation. With Sir Alexander's concurrence he had tied the femoral artery to control bleeding and had then made an incision into the tumour. He had found not a sarcoma, but osteo-myelitis of a mild type with broken down tissue just as Dr. Glissan has described. They had left the wound well open and the patient had done very well. Dr. Poate had mentioned that the civil ambulance men were not necessarily required to be efficiently trained. He was astounded to hear this. He thought that the Council should take some steps to see that this state of affairs was altered. He agreed that castor oil and balsam of Peru made an excellent dressing. Several former resident medical officers of the Children's Hospital had told him that blood transfusion was of great value to tide patients over the acute infection. It seemed to him rather illogical and he noticed that not one on the staff of the Children's Hospital had mentioned this.

A MEETING OF THE OBSTETRICAL COMMITTEE OF THE QUEENSLAND BRANCH OF THE BRITISH MEDICAL ASSOCIATION was held at the B.M.A. Building, Adelaide Street, Brisbane, on October 23, 1928, DR. C. GIFFORD CROLL, the President, in the chair.

Uterus Bicornis.

DR. F. A. HOPE MICHOD showed a patient who had been referred by Dr. J. Wagner, of Esk, to the Lady Bowen Hospital for treatment. The patient who had had one child, was thirty years old. She had been six months pregnant and had had a tumour growing from the left side of the uterus. On examination the uterus had been enlarged to the size of an eight months' pregnancy and had been lying obliquely in the abdomen on the right side of the patient and containing the fœtus. The presentation had been a breech. On the left side of the uterus

a large tumour had been felt closely attached to the uterus and separated from it in its upper part by a deep cleft. While the patient was being examined a uterine contraction had been felt in the tumour and the diagnosis of *uterus bicornis* had been made. The patient had then been examined under a general anæsthetic and the breech presentation converted into a cephalic by external version, the breech having been pushed into the left horn of the uterus. The new position of the fœtus had been left occipito-anterior, with the breech actually in the "tumour." The upper part of the uterus on the right side had been empty. X ray examination before version had been done, had shown that the fœtus was in the right side of the uterus, but after version the fœtus had been found in the left side with the head in the pelvis and also with signs of pressure on the vertebral column of the fœtus in the centre line of the uterus. In addition, although the buttocks, legs and one of the arms were in the left side of the uterus, the other arm had still remained in the right half. The diagnosis had then been made of *uterus bicornis subseptus*.

The patient was then examined by the members and a discussion followed.

DR. ALEX. H. MARKS thanked Dr. Michod for showing the patient and said that the pregnancy appeared more than six months. He thought she was at least eight months pregnant and that it would have been possible for her to have menstruated after pregnancy commenced on account of the double horn. As regards treatment he said he would let the pregnancy continue till term, give a test of labour and if necessary perform Cæsarean section.

DR. K. WILSON said that to his mind there appeared to be two sources of possible trouble at the confinement. He thought that the polarity of the uterus might be disarranged and so uterine inertia might occur and also that the normal contraction and retraction of the uterus after the end of the second stage might not occur, making the possibility of *post partum* hæmorrhage much more likely. He thought the correct treatment would be that given by Dr. Marks, allow the pregnancy to continue to term, give a test of labour with Cæsarean section if that failed.

DR. C. G. CROLL thanked Dr. Michod for showing the patient and agreed with the previous speakers in giving a test of labour at term with Cæsarean section in reserve.

Quarterly Report.

The third Quarterly Report of the Committee was then read by the Secretary and a discussion followed in regard to the cases of morbidity.

DR. ALEX. MARKS said that the conditions of the maternity homes varied considerably. Some were of high standard, but some were of low standard with a poor type of nurse. He raised the question as to whether the name of the maternity home should not be included on the case records by the member. He said that the results of this would be of much value to obstetrics.

DR. E. S. MEYERS asked what became of the patients that were morbid during the puerperium in maternity homes. He thought that the fact that many of them were nursed in the homes might be the reason for the prevalence and even the spread of sepsis. He thought that the Section should approach the proper authorities through the Branch with suggestions which might improve conditions and help to prevent the spread of sepsis.

DR. C. G. CROLL thought that the figures for the Lady Bowen Hospital which were the highest, were exact, but that those from the maternity homes were not always so.

DR. F. A. HOPE MICHOD said that if members included a temperature chart in their returns for patients who were morbid, it would be a help to the Committee. In answer to a question he said that the standard of morbidity used was 38° C. (100·4° F.) rise lasting for twenty-four hours or a rise of temperature to 38° C. (100·4° F.) on two separate occasions during the puerperium.

The detailed records of four mothers who died during the quarter were read:

Tubal Suppuration.

CASE NUMBER 216.—Mrs. M.C., age not stated, was a *primipara*. The estimated date of confinement had been September 2, 1928. Her general physical condition had been good. There had been no antenatal abnormality except that the patient had a cloud of albumin in the urine on two occasions and the urine reduced Fehling's solution for the last eight weeks. The delivery had been natural, the first stage lasting forty-one hours, the second stage three and a half hours and the third stage half an hour. The presentation had been vertex, left occipito-anterior, the child had been born alive, had weighed three kilograms (six pounds fourteen ounces) and was full term. The perineum had been torn to the first degree and this had necessitated the insertion of one suture. The placenta and membranes had been complete. In the first day of the puerperium there had been pain in the left iliac fossa which was relieved by the administration of an enema. She had then developed pain in the right iliac fossa and after consultation on the third day an abdominal section had been performed. The appendix had been long, but not inflamed. A mass had been present in the right broad ligament which discharged pus. Drainage had been provided for and the abdomen closed. On the following day the lochia had been offensive for the first time. The temperature had been 39·5° C. (103·2° F.) when the patient was transferred to hospital for operation. On the fifth day of the puerperium it had been 38·9° C. (102° F.), 38·9° C. on the sixth day, 40° C. (104° F.) on the seventh day, 40·2° C. (104·4° F.) on the eighth, 39·7° (103·6° F.) on the ninth day and it had risen to 40·7° F. (105·4° F.) on the tenth day just before the patient died.

DR. R. G. QUINN said that the patient was one of his and that he felt that the mistake made was in diagnosing appendicitis instead of a broad ligament abscess. He felt that the result might have been more favourable if he had waited until the mass had increased in size and then performed posterior colpotomy. He was influenced largely by the absence of any abnormality of the lochia in thinking the condition was not one of sepsis and it was this fact which had decided the question of opening the abdomen. The patient had been examined once *per vaginam* by the sister in charge of the nursing home the evening before the confinement and she had not been examined again *per vaginam* until after the operation.

DR. F. A. HOPE MICHOD said that some years previously he had seen a similar case. The abdomen had been opened through a pararectal incision, a broad ligament abscess recognized, the abdomen closed and the abscess drained by means of a posterior colpotomy. The patient had died.

DR. HEDLEY BROWN related the history of a patient he had seen three years previously. Her temperature had risen to 40·5° C. (105° F.) within twenty-four hours of her confinement. She had complained of pain in the right side and her abdomen had been opened. The appendix had been found normal, but the right tube had been inflamed. Her abdomen had been closed and later she had been found to have filaria in her blood.

DR. H. S. WATERS asked the surgeons present if they had found acute appendicitis common in the puerperium. In his small experience he had found the cause of right sided pain accompanied by rise of temperature to be tubal conditions. He asked whether it was not easier to exclude appendicitis by examination *per vaginam* rather than *per rectum*.

DR. ALEX. MARKS said in his opinion the surgeon was not wrong in opening the abscess as he had done. He thought that in this case the abscess should have been opened even if through the abdominal wall. He had one case to report in the next quarter's series in which he had opened the abdomen for what he thought was appendicitis, but had found a large mass of adhesions around the appendix and right tube. The abdomen had been drained. He said he could not see what the bugbear

in making examinations *per vaginam* was. If aseptic and antiseptic precautions were taken, there was no increased risk in making vaginal examinations and their value was considerable. If the morbid conditions in the series were studied, it would be found that of the morbid patients many had not been examined and *vice versa*. He thought that there was a good deal more than the making of vaginal examinations in the causation of puerperal sepsis. The patient he quoted had not been examined at all.

DR. C. G. CROLL said that the case reported had been a normal and correctly conducted confinement. He agreed with Dr. Marks's remarks about vaginal examinations, but thought they should not be done unnecessarily and certainly not by a nurse. There was an ever present danger of sepsis. As regards exogenous infection, he said that normally the steady downward stream from the cervix was protective and rendered ascending infection unlikely. He mentioned the fact that an infected intestinal tract or pyelitis might be responsible in some cases. As regards the patient operated on, he had seen a similar case in which the abscess of the broad ligament had been on the left side. A good surgeon had operated, the same treatment had been given, but the patient had died. This patient had had pyelitis of pregnancy and this had been the source of the infection.

DR. HEDLEY BROWN said it was of interest to decide whether the source of infection had been present in the patient herself. Possibly there had been a preexisting broad ligament condition which had been stirred up by the confinement. This was suggested by the rapidity of onset.

Septicæmia.

Case history Number 285 was then read. Mrs. M.C.W., *ætatis* thirty-eight years, was pregnant for the second time. The expected date of confinement was August 16, 1928. She had had no miscarriages. In her first confinement the patient had had an instrumental delivery and adherent placenta. During the puerperium from the fourth day onwards she had had rigors for about five weeks. Eventually the condition had subsided. She had had nothing abnormal antenatally and no complications of pregnancy. She had had a natural delivery, the presentation being vertex in the left occipito-anterior position. The child had been alive and was full term. The placenta and membranes had been ragged. Adherent placenta had occurred and had had to be removed manually. On the fourth day of the puerperium the patient had had two rigors and a temperature of 38·9° C. (102° F.). Her highest temperature was on the ninth day and had been 40·5° C. (105° F.). She had died on the thirteenth day showing the classical picture of septicæmia.

DR. F. A. HOPE MICHOD asked the meeting for the reasons for manual removal of a placenta. He would like to know the length of time the placenta should be left.

DR. E. S. MEYERS said that in regard to Case Number 216 the only constant factor was the nursing staff. He said that the question of treating these patients in nursing homes was unsatisfactory and dangerous. One solution would be to insist on transferring them to a place of isolation as a record could then be kept and some control exercised. In regard to Number 285 he said it was interesting to discuss the indications for removal of a placenta. Hæmorrhage of course was the principal one, but in the absence of that, how long could a placenta be left without danger?

Dr. Michod thought that the procedure of manual removal of a placenta was a most dangerous one. Of late years he had left them a long time before removal, the longest being twenty-four hours. The main indication was hæmorrhage and apart from that there was no limit within twenty-four hours, if the patient was in good surroundings. If the surroundings were not favourable, it depended on the time the practitioner had to give.

DR. SHIRLEY LANE said that one author advised to wait three days if necessary.

DR. H. S. WATERS said that there was one method which avoided manual removal, and that was injecting sterile saline solution along the umbilical cord.

Dr. Michod, in answer to a question, said that he was of the opinion that pituitrin given during the third stage expelled the placenta.

DR. C. G. CROLL said that he had had to remove an adherent placenta for hæmorrhage in one of his patients. It had been the worst case he had had and he had had much difficulty. He had not tried leaving the placentæ in the uterus for twenty-four hours when there was no hæmorrhage, but he would certainly do so if the surroundings were favourable. He said that the length of time it should be left was a matter for the judgement of the practitioner in charge of the case.

Post Partum Eclampsia.

Case history Number 313 was then read. Mrs. J.G., of Australian nationality, whose age was twenty-nine years had been due for her first confinement. The estimated date had been July 23, 1928. Her general physical condition had been good. Her antenatal examinations had been normal and her urine had been free from albumin on July 6, 1928. On July 16 the patient had been admitted to a maternity home with definite œdema of the legs and abdominal wall. Her blood pressure had been: systolic, 135 millimetres; diastolic, 105 millimetres. Her urine had become almost solid on boiling. She had received eliminative treatment. On July 19 the cervix had been fully dilated and under ether anæsthesia forceps had been applied and the child delivered with difficulty. The child was still-born and weighed 4·5 kilograms (ten pounds). The *liquor amnii* had been excessive in amount. The patient was exhausted, but had improved in twenty-four hours. Four days after the confinement the patient had had four fits and on the following day further fits. On the ninth day she had been dyspnœic and coughing and on the eleventh day she had become comatose and died.

DR. E. S. MEYERS thought that there were too many *post partum* eclamptics lost through poor surroundings. He had seen two patients in consultation for whom not enough treatment had been carried out. He thought that chloroform first and ether second helped to kill patients and he felt very strongly in the matter.

DR. C. G. CROLL said that he had had two deaths from *post partum* eclampsia and he thought it had been due to failure of eliminative treatment. He thought it very necessary to reach the accumulation of fæces in the colon and remove it all. He had had one case of albuminuria of pregnancy in which it had been necessary to perform induction. After the delivery the patient had passed two or three bed pans full of filthy fæcal matter. In another case the patient had developed albuminuria which increased rapidly to "Esbach-5" at the eighth month and her blood pressure had been raised. After persistence in eliminative treatment for four days the patient had passed a lot of fæcal matter and after this her condition had gradually cleared up and she had gone to term. In this instance the child had been lying in the left occipito-posterior position, but as soon as the bowel had emptied it had been in the right occipito-anterior position. Possibly at first it had been pressing on the descending colon and with the alteration in position, the colon had been able to empty itself.

DR. F. A. HOPE MICHOD asked Dr. Brown for details of his eliminative treatment. He thought that irrigation of the colon was most important and that nurses did not do it properly. He said it was necessary to pass the tube beyond the brim of the pelvis and it was then possible to get many litres of fluid into the colon. He insisted on a funnel holding at least one litre and initiated a flushing process with the funnel by lowering and raising it quickly.

DR. BROWN said his treatment had been mainly morphine, magnesium sulphate and hot packs.

DR. K. WILSON asked for information as to the danger of anæsthetics in eclampsia. Some authorities stated that chloroform was a deadly poison and should never be given, while others used it as a routine with equal or better results. He said that he had never seen any harm from either ether or chloroform and used both.

DR. ALEX. MARKS said that he had used chloroform in all his cases and did not see any harm from it.

DR. E. S. MEYERS said that the good results published by Stroganoff might be due to his treatment otherwise and might be obtained in spite of chloroform.

Septicæmia.

Case history Number 356 was then read. Mrs. K., whose age was thirty-two years, had been confined of her first child. Her estimated date of confinement had been August 17, 1928. Her antenatal examination had revealed a cloud of albumin. She had had swelling of the feet during her pregnancy. During labour which had commenced on July 30, the cord had prolapsed and been replaced. The presentation on delivery had been persistent occipito-posterior and the first stage had lasted seventeen hours, the second two hours and the third half an hour. The delivery had been instrumental on account of fœtal distress, the child being still-born and weighing 2·2 kilograms (five pounds). It had been about one month premature. The perineum had been torn to the second degree and this had necessitated two sutures. The placenta and membranes had been intact. During the puerperium the temperature had commenced to rise and on the fourth day reached 39·4° C. (103° F.). On the fifth day the patient had had a rigor and the temperature had been 40·5° C. (105° F.). Blood culture on the sixth day had been sterile. The uterus had involuted normally and the lochia had not been offensive. Vaginal examinations had failed to reveal any pelvic cause of trouble apart from infection of the perineal tear. The patient had died during the third week.

Dengue Fever.

Case history Number 242 was then read. This history was that of a normal confinement in every way, but was read because the patient had had a febrile puerperium which was that of a typical case of dengue fever.

In the discussion DR. C. G. CROLL said that he agreed that the condition was dengue, but it was easy to be confused in the puerperium. One patient of his had had a rise in temperature on the seventh day. He though it was a case of puerperal sepsis, but could find nothing to account for it. On the seventh day a Widal test had yielded a reaction and it had turned out that the patient was suffering from typical typhoid fever.

Ankylosis of the Femur to the Ilium.

Case history Number 309 was then read. T.R.K., of Australian nationality, whose age was twenty-one years, had been confined of her first child. Her estimated date of confinement had been September 3, 1928. The patient had given a history of having suffered from disease of the left hip joint from the age of three years. She had been a constant attendant at the Hospital for Sick Children for ten years. On examination it had been found that the left femur was firmly ankylosed to the ilium in a position of partial adduction. The pelvis had been tilted so that the crest of the ilium on the left side was five centimetres (two inches) higher than that on the right. After a consultation it had been decided to induce labour at about the thirty-sixth week. On July 26 surgical induction had been commenced and the patient had come into labour. The first stage had lasted eighteen hours, the second one and a half hours and third one-quarter of an hour. The delivery had been natural, the presentation being left occipito-anterior. The child had been born alive, weighed 2·1 kilograms (four pounds eleven ounces) and was about thirty-six weeks of age. The perineum had been torn to the first degree, two sutures being necessary. The placenta and membranes had been intact. The puerperium had been morbid, the highest temperature being 38·5° C. (101·4° F.), the rise taking place in the first forty-eight hours. The member had decided that in future pregnancies he would allow the patient to go as far as the thirty-eighth week before induction.

In the discussion, DR. H. S. WATERS said that he had seen a patient with an ankylosed right hip joint who was pregnant. She was a *multipara*, but it had been impossible to get at the oncoming head at the end of the second stage. The patient had managed to deliver herself at full term.

Induction of Labour.

Case history Number 329 was then read. Mrs. G.F., whose age was forty-one years, of Australian nationality, had been pregnant for the first time. The estimated date of confinement had been August 2, 1928. Her antenatal examinations had revealed no abnormalities until June 10, when there had been a slight cloud of albumin. Six days later there had been a heavy precipitate and she had been admitted to hospital for eliminative treatment. She had been subjected to starvation for four days, followed by very light diet, saline cathartics and washing out of the bowel. The effect of treatment had not been successful and induction of labour had been commenced on June 30. Ovarian residue, given intramuscularly, had been tried without result, then Luker's method with pituitrin without response. On July 2 the membranes had been separated from the internal *os* and a stomach tube inserted into the uterus. Further pituitrin and ovarian residue had been administered to assist the action of the stomach tube with little result. The stomach tube had been removed after having been in the uterus for forty-five hours. On July 5 there was no dilatation of the cervix, but the cervix had been "taken up" and uterine contractions were only slight. A general anæsthetic had been administered and the cervix dilated manually from one finger to full dilatation, the child had been rotated manually from an occipito-posterior position and delivered with forceps. The child had weighed 2·5 kilograms (five pounds ten ounces) and had been apnœic and blue, but had breathed a little with stimulation and had died two hours later. Thirty cubic centimetres of antistreptococcic serum had been administered shortly after the delivery. The puerperium had been normal, the temperature once having risen to 37·1° C. (99° F.). At the commencement of treatment the systolic blood pressure had been 145 and the diastolic pressure 95 millimetres of mercury. At the end of treatment, one week later, the figures had been 140 and 90 millimetres and two weeks later they had fallen to 120 and 80 millimetres.

In the discussion DR. K. WILSON mentioned his experience with ovarian residue as a means of inducing labour. He gave it intramuscularly in doses of one cubic centimetre about every three hours until labour commenced or until he was satisfied that it was having no effect. He had found that it, like all other methods of medical induction, was not a complete success, but was satisfied that it was of definite value. He mentioned one case in which it had been successful, namely that of an eclamptic who had been admitted to the Lady Bowen Hospital having fits. She had been seven months pregnant and had had no antenatal supervision. She had been treated by sedatives and elimination and had recovered from her eclampsia without coming into labour. It had been decided to induce labour a few days later as her condition was at a standstill, the albumin remaining stationary and her blood pressure not falling. The fœtus also had not survived the eclampsia. She had accordingly been given ovarian residue intramuscularly at three hourly intervals and after the second injection had come into strong labour and delivered herself in a short labour of a still-born somewhat macerated fœtus. From then on her condition had steadily improved.

Before the meeting closed DR. CROLL said that the meeting was under a debt of gratitude to the members of the Statistical Committee for the trouble they had taken over the presentation of the cases.

A MEETING OF THE VICTORIAN BRANCH OF THE BRITISH MEDICAL ASSOCIATION TOGETHER WITH THE STATE DENTAL SOCIETY OF VICTORIA was held at the Medical Society Hall, East Melbourne, on September 25, 1928, MR. J. E. DOWN, O.B.E., the President of the State Dental Society, in the chair.

PROFESSOR F. C. WILKINSON read a paper entitled: "Oral Sepsis and General Health: Clinical Aspect" (see THE MEDICAL JOURNAL OF AUSTRALIA, February 23, 1929, page 230).

PROFESSOR P. MACCALLUM read a paper entitled: "Dental Sepsis and General Disease: Pathological Aspect" (see THE MEDICAL JOURNAL OF AUSTRALIA, February 23, 1929, page 232).

DR. C. H. KELLAWAY read a paper entitled: "Some Bacteriological Aspects of Apical Infection in Its Relation to General Disease" (see THE MEDICAL JOURNAL OF AUSTRALIA, February 23, 1929, page 234).

DR. W. A. MORRISON expressed his gratification at the fact that a combined meeting of the State Dental Society of Victoria and of the Victorian Branch of the British Medical Association was being held each year. He referred to the work of Hunter who had focused attention on the pathological aspects of dental sepsis. Unfortunately Hunter had introduced the term "gold traps of sepsis." He had applied this term to various forms of crown and bridge work. In Dr. Morrison's opinion he had diverted attention to the inert superstructure instead of to the inadequately treated or improperly retained tooth on which the crown or bridgework had been placed. A gold crown, a pivot or a bridge did not necessarily imply septic dentistry. Any tooth possessing a devitalized pulp might be regarded with suspicion and a tooth with an untreated apical infection or alveolar pyorrhœa was a definite menace. He criticized Professor Wilkinson for having failed to describe pyorrhœa as an insidious poisoner of the system. Pyorrhœa might be a symptom of vitamin deficiency; he felt sure that the process starting in one tooth sooner or later would originate serious secondary disorders. He pointed out that pyorrhœa rarely affected only one tooth. In the monkeys used for experimental purposes the pyorrhœa or pyorrhoid condition was no sooner established than the animals were placed on a normal diet and the local condition cleared up. But many people with alveolar pyorrhœa did not present themselves for treatment until the secondary effects had caused definite disability or chronic invalidism. When this had taken place, constitutional treatment failed to cure the pyorrhœa. Constitutional and local treatment usually sufficed and at times dental treatment alone cleared up the dental sepsis and held the secondary effects in check. He quoted from D. A. Crow's manual that the surface absorbing poison into the blood stream from an extensive involvement of the four lower incisors represented an area of forty-five millimetres by forty-five millimetres (about three square inches). Crow had found that pyorrhœa was indirectly responsible for not a few deaths, the commonest processes being abscess of the appendix, duodenal or gastric ulcer with perforation, *otitis media*, cholecystitis, pyæmia, pernicious anæmia, malignant endocarditis, pneumonia, chronic nephritis and Ludwig's angina. This was not a fantastic statement of a dentist, but the considered opinion of a medical practitioner after a thorough investigation. Dr. Morrison claimed that this opinion was free from all suspicion of bias.

He congratulated Professor Wilkinson on the excellent slides he had shown depicting apical infections. He raised the question whether or not these infections were a menace to health. He held that the slides had demonstrated that all teeth with devitalized pulps were not necessarily inimical to good health in the second half of life. Skiagrams were not infallible guides to the extent or even to the existence of periapical infection. He maintained that when a skiagram disclosed an apical infection, the condition was invariably worse than the shadow picture suggested.

Turning to the pathological aspect, he expressed the opinion that they were more interested in the pathology of the secondary effects than in that of the primary dental focus. He regretted that Professor MacCallum had said very little concerning this aspect of the problem. There were many who discounted Rosenow's hypothesis of elective localization. He, the speaker, claimed that this work had received ample confirmation both by Rosenow and by others. Russell Hayden had inoculated 1,500 animals with cultures from five hundred and one patients. These patients had been suffering from lesions attributed to dental sepsis. The cultures had been made from septic teeth; there had been a tendency to elective localization in the same organ or tissue of the animal as in the patient. For example, when the patient had a kidney infection, 85% of the animals developed kidney infections. Endocarditis had been produced in 57% of animals inoculated with cultures from patients who had endocarditis. Kidney infections and endocarditis had been produced in but 28% and 17% of the animals when the cultures had been derived from the septic teeth of persons without secondary lesions. He maintained that figures of that kind could not be ignored, but they had to remember the other side of the question, as related by Dr. Kellaway.

He stated that the most frequent secondary expression of dental sepsis was lassitude. Price had found that a microscopical examination of the blood of patients revealed a decrease in the polymorpho-nuclear leucocytes and an increase in the small lymphocytes. Dr. Kellaway had indicated a means by which a more definite diagnosis of focal infection might be made by a more complicated form of blood study. He regretted that Dr. Kellaway had omitted to deal with the bacteriological aspect of pyorrhœa. No mention had been made of anaphylaxis by the readers of the papers. They were accustomed to speak of toxins produced by the bacteria in the mouth, but it seemed that they did not produce true toxins. Were the toxic effects caused in any other way? He suggested that an alien protein introduced into the patient reacted in a peculiar manner if the same organism or the same protein gained entrance later on in a larger dose. The reactions might be severe and dangerous. He submitted that the condition was one of sensitization.

He asked Dr. Kellaway whether it was not possible for individuals with dental sepsis to become sensitized to the protein of the infecting organisms. If the patient subsequently had an acute infection of the tonsil from the same bacteria, would there not be a systemic reaction and an aggravation of the original dental lesion? If this happened, it would explain how the cure of dental sepsis was dependent on the elimination of every other focus of systemic infection. It would also explain the otherwise unaccountable reaction which at times followed the removal of half a dozen pyorrhœic teeth which had not affected the patient to a serious extent while they were in his mouth.

MR. J. E. DOWN referred to the fact that the dentists frequently received requests from medical practitioners to examine particular teeth. He interpreted this as an indication that the medical profession was giving thought to the problem. There was a great opportunity for the dentists to reap benefit from the line of reasoning their medical colleagues were adopting. He entertained rather strong views on the subject. He was sorry that they had such staunch disciples of Rosenow, because he thought that his data could be used in opposition to his arguments and had been so used by other investigators in his own country, the home of the radical attitude towards pulpless teeth. The pendulum had swung towards a more conservative outlook. He thought that it was hardly fair to examine skiagrams of work carried out ten to twenty-five years previously and to regard the number of foci found as an indication of the capability of the operator. He wished to point out that the good work possible in canal therapy was wrapped up with a question of economics. It was costly to carry out root filling work properly and beyond the purse of a great many people. They received the treatment they were paying for. This could not be avoided. He wished medical practitioners would realize this fact and neither condemn all root canal work nor come to the conclusion that all pulpless teeth were a potential menace to the life and well being of the patient.

DR. J. NEWMAN MORRIS endorsed Dr. Morrison's opinion concerning the value of joint meetings of the State Dental Society of Victoria and the Victorian Branch of the British Medical Association. Like the majority of medical practitioners he suspected teeth among other things when hunting for a source of infection. He then placed the onus on the dentist of saying whether or not there was dental sepsis. He left it to the dentist to decide what should be done to the teeth. He held the opinion that it was not for the medical practitioner to dictate to the dentist that one tooth should be extracted and another left. He thought that it would be advantageous if Professor MacCallum introduced a little dental pathology into the medical course. They had been in the habit of

speaking of a gold crown of fifteen years' standing as a gilded sepulchre of sepsis and of advising the patient to have it removed. The more recent attitude was to ask the dentist whether it should not come out. They could not criticize mechanical work, because they knew nothing about it. He was satisfied that all pulpless teeth were not necessarily a danger to the system.

MR. F. GAUNSON called attention to the fact that three terms had been employed, dead teeth, devitalized teeth and pulpless teeth. It was rather alarming to receive a note from a medical practitioner that a patient had so many dead teeth. A dead tooth was a necrotic body. A devitalized tooth was the same as a dead tooth. A pulpless tooth was one from which the pulp had been removed; the tooth might be retained without any impairment of the general health. A statement had been made at another meeting that a pulpless tooth without any radiographic evidence of infection in a patient without clinical evidence of infection had been extracted. Examination of the socket had revealed a streptococcal infection. He asked whether it was possible for such a condition to be present without any change in the bone surrounding the tooth. He held that much experience was required for the correct interpretation of dental skiagrams. Brophy had pointed out that a tooth considered to be sterile, when sterile water had been forced through the root and a skiagram taken gave rise to the same radiographic appearances as a tooth with a granuloma at its apex. The question when to render a tooth pulpless was causing them a great deal of concern. If a young patient had a beautiful denture in which one of the teeth might have to be rendered pulpless, they endeavoured to get into touch with the medical attendant to ascertain whether or not such action would be detrimental. Some authorities had suggested that blood counts and analysis of urine should be carried out. He asked whether they could forecast the future effect on the patient of the removal of the pulp.

MR. K. ADAMSON said that he understood that Dr. Morrison had referred to the four incisors being included in an area of twenty square centimetres (about three square inches). This would be on the assumption that the pockets around the teeth had a total area of ulceration. If anyone examined a number of sections from the same tooth, cut through in the mesial-distal direction, he would see ulceration in one or possibly two of the sections, but out of a dozen ten would contain no signs of ulceration. This meant that the ulceration around the tooth might exist in one-tenth of the area around the tooth. How could they estimate the total ulceration in connexion with four teeth, when it was not in any one tooth and when it might not exist at all?

DR. W. J. TUCKFIELD thought that it was an excellent idea to have conjoined meetings. It was gratifying to note that throughout the three papers, two by medical practitioners and one by a dental practitioner, optimism had prevailed. It had been his privilege a few years previously to listen to two authorities who had been mentioned, Russell Hayden and Weston Price. He had listened to these two men for some hours while they stated that every pulpless tooth should be removed. It was interesting to hear two medical practitioners questioning whether a tooth was a menace to the general health or not. According to the opinion of the three speakers and according to the opinions of many writers on the subject, it was a difficult matter to decide whether and when a suspected tooth should be removed and whether and when the patient should take a chance. It seemed to him that they had to determine whether the patient's general resistance was sufficient to overcome the menace that might be present. He was inclined to agree with Price that a person under the age of forty years might be able to cope with evident sepsis, but that even after the sepsis had been treated and apparently removed, it was doubtful whether the tooth should be allowed to remain in the mouth of a person over the age of forty. It was difficult to ascertain whether the area could be sterile or whether when it still manifested some signs, it was always septic. Price had once stated that persons with very large disturbance were not as a rule in so dangerous a position as those who manifested little signs of disease. When there was a definite reaction, Nature was doing its best to cope with the condition and was combating the infection, often with success. He was pleased to hear from Dr. Newman Morris that medical practitioners were leaving it to the dental practitioner to decide whether or not a tooth should be removed. He believed that the higher a practitioner's position in the medical profession, the less was he inclined to interfere with the dentist. It was more often the general practitioner who was inclined to be autocratic in this connexion. He was of opinion that many practitioners did not realize that it was not the gold crown or the large filling that gave trouble, but the underlying root. He suggested to the Victorian Branch that the members should be cautious in regard to their recommendations in favour of the extraction of a tooth. There was not the slightest doubt that a gold crown was not any more a menace than the smallest filling in a pulpless tooth; in other words it was the root and not the filling or crown that was the potential danger. At times crowns had shelves that might shelter a few million organisms; these were a menace and might be the exciting cause of pyorrhœal conditions. He thought that the medical profession needed some information in regard to crown work in general. He had hoped that Dr. Kellaway would have dealt with the subject of a patient being sensitized to any particular toxin, as mentioned by Dr. Morrison. They often saw a patient from whose mouth several teeth had been extracted; the patient had to spend several days in bed after the extraction and there was fever. There might be no signs of local abnormality; the wound might have healed and yet the patient was in bed with fever day after day. Was that condition caused by an extra dose of toxin following the wholesale extraction of teeth?

In his reply Professor Wilkinson confined his remarks to one question asked by Dr. Morrison. It had been answered in part by Mr. Adamson. Crow had published a little book in which he had shown the dangers of pyorrhœa in a diagrammatic manner. By mathematical calculations he had endeavoured to prove that when all the teeth were affected, there was an infected area of about fifty centimetres by twenty-five centimetres. It was purely hypothetical. It had not been based on observation. He had not observed these infections. He had based his calculations on the fact that he had seen pus welling up around the neck of a tooth. A very minute ulcer, the size of a pin's point, would soon provide sufficient material to fill up the ulcer cavity. That was what actually took place. They had examined a very large number of the sections and had found that there usually was a very tiny ulcer in some part of the pocket which accounted for the pus; those mathematical calculations were pure fiction.

PROFESSOR MACCALLUM referred to the reason why he had not dealt with the pathological changes in distant organs resulting from dental sepsis. He had been asked why the patient was ill after multiple extractions. He had been appalled at the number, severity and apparent lack of association with the original focus. He thought that the general proposition rather than the detailed pathology of particular infections was the more important, because if they started at the periphery of the subject and worked towards the centre, they might be a long time getting there. He had also been asked why a focus gave rise to other foci in the body. In reply he wished to point out that it was not certain that the secondary effects on the tissue were the result of the absorption of the toxin or the association with other foci in the body. The question arose whether or not they could eliminate the disease by the removal of the primary focus. If the organisms had established themselves in the body and if the general resistance was not raised, the actual removal of the primary focus would not be effective. Unless the two processes of raising the resistance and removing the focus were combined, the results were not likely to be permanent.

DR. KELLAWAY apologized for the loose references to devitalized, pulpless and dead teeth. Mr. Gaunson had raised the question as to the possibility of an estimate being made by the study of the blood picture concerning the possible activity of a particular focus of infection. A great deal of work had been done on the matter. The latest contribution by Hayden seemed to show that there was nothing in the story at all and that the investigation

of the blood picture did not throw the smallest possible light on the danger of an infective process at the root of a tooth.

In reply to Dr. Morrison he said that he had not dealt with pyorrhœa for two reasons. In the first place there was so much to say about apical infection that there would not have been enough time to talk about pyorrhœa as well. The second reason was that he knew nothing about the subject. The question of anaphylactic manifestations was an important one. It had been noted by competent observers that it was absolutely necessary when there were many infected teeth to remove only a few at a time. Every practitioner had seen the associated condition in the general reaction flare up and high fever occur in patients with definite focal infection as a result of an attempt to do too much at a time. As this had been recognized, it became necessary to find an explanation of the phenomenon. In some conditions there was an opening up of areas of tissues that had been walled off by the process of chronic inflammation; organisms or their toxins were then liberated. In some circumstances, as Dr. Tuckfield had pointed out, the injuries following the extraction of teeth were not sufficiently extensive to justify this hypothesis. Dr. Kellaway thought that the probable explanation would then be found in the existence of sensitiveness on the part of the patient to the proteins of the organisms present at the roots of the teeth. Faber had carried out some twelve years previously a few rather interesting experiments. He did not know if any one had since confirmed them. When he injected dead streptococci into the joints of animals, the joints became sensitive. When living organisms of the same strain were subsequently injected, they became localized in these joints. Whether a local sensitiveness of tissues or whether it was merely a question of damage to the local tissue that played a part in the phenomena of localization from one focus to another secondary focus of infection, it was very difficult to say.

NOMINATIONS AND ELECTIONS.

THE undermentioned have been nominated for election as members of the New South Wales Branch of the British Medical Association:

Lipscomb, Griffin Thomas, M.B., B.S., 1928 (Univ. Sydney), Wiston, Marathon Road, Darling Point.

Williams, Morris Albert, M.B., B.S., 1927 (Univ. Sydney), Sydney Hospital.

McEncroe, Francis John, M.B., Ch.M., 1927 (Univ. Sydney), 69, Liverpool Street, Paddington.

Post-Graduate Work.

POST-GRADUATE COURSE IN BRISBANE.

THE Queensland Branch of the British Medical Association has arranged a post-graduate course to be held in Brisbane from April 29 to May 3, 1929.

The syllabus will include a lecture by Dr. R. R. Stawell on some medical subject. He will give a demonstration of the early diagnosis of pulmonary tuberculosis and of common diseases of the nervous system. Dr. C. E. Corlette will deliver a lecture on the use of local anæsthesia in general surgical practice. He will operate at the Brisbane Hospital for the purpose of demonstrating his methods and he will give a special demonstration on the treatment of fractures.

Dr. A. V. Meehan will lecture on the treatment of anterior poliomyelitis and will give demonstrations in connexion with the same subject. A lecture will be given on the radiological treatment of malignant disease.

The subscription for the course is two guineas. This includes a double ticket for a dance and bridge party on the evening of April 29, 1929.

Country members are requested to notify the Honorary Secretaries, Dr. Neville G. Sutton and Dr. S. F. McDonald, that they propose to attend the course as early as possible. They are asked to state whether they will be alone or accompanied by their wives.

The Bancroft Oration will be delivered on May 3, 1929, by Dr. R. R. Stawell. The subject of the oration will be "Disorders of the Pituitary Body."

Corrigendum.

OWING to an unfortunate oversight, several errors in the article by Dr. H. A. McCoy, published in last week's issue, were not corrected. On page 240 the twentieth and twenty-first lines in the second column should have read as follows: "The increase of weight is attributed by Voltz to an alteration of the body metabolism." In the same column, twenty-one lines from the bottom the reference should be to a filter of one millimetre of copper. In the same column four lines from the bottom "γ radiation" should take the place of "X radiation."

Obituary.

JOSHUA NORMAN WOODHEAD.

WE regret to announce the death of Dr. Joshua Norman Woodhead which occurred at Maryborough, Queensland, on February 19, 1929.

COURSE IN TROPICAL MEDICINE AND HYGIENE.

ARRANGEMENTS are now in hand by the Commonwealth Department of Health for the annual course of training in tropical medicine and tropical hygiene for medical graduates at the Australian Institute of Tropical Medicine, Townsville.

Should a sufficient number of applicants be forthcoming, it is proposed to commence the course about May 1, 1929. It will extend over the ensuing twelve weeks, terminating about July 24, 1929.

The Australian Institute of Tropical Medicine is very fully equipped with all facilities for the teaching of its special subjects and has available a very large amount of tropical pathological material, in addition to an extensive library.

A fee of ten guineas will be charged for the course to cover costs.

Townsville is in communication by rail and steamer with the Australian capitals. Hotel accommodation is obtainable at rates ranging from £2 2s. to £4 10s. weekly.

Intending applicants should communicate with the Acting Director, Division of Tropical Hygiene, Commonwealth Department of Health, Eagle Street, Brisbane, or the Acting Director, Australian Institute of Tropical Medicine, Townsville, North Queensland, either of whom will furnish particulars of the courses of teaching and practical work.

Proceedings of the Australian Medical Boards.

TASMANIA.

THE undermentioned has been registered under the provisions of *The Medical Act*, 1918, of Tasmania, as a duly qualified medical practitioner:

Magner, James, L.R.C.S., L.R.C.P., L.M. (Dublin), 1916, Hamilton.

Books Received.

LABORATORY DIAGNOSIS AND EXPERIMENTAL METHODS IN TUBERCULOSIS, by Henry Stuart Willis; 1928. London: Baillière, Tindall and Cox. Royal 8vo., pp. 355, with illustrations. Price: 16s. net.

EXERCITATIO ANATOMICA DE MOTU CORDIS ET SANGUINIS IN ANIMALIBUS, by William Harvey, M.D.; with an English Translation and Annotations by Chauncey D. Leake; 1928. London: Baillière, Tindall and Cox. Royal 8vo., pp. 240, with illustrations. Price: 16s. net.

OLD MASTERPIECES IN SURGERY, BEING A COLLECTION OF THOUGHTS AND OBSERVATIONS ENGENDERED BY A PERUSAL OF SOME OF THE WORKS OF OUR FORBEARS IN SURGERY, by Alfred Brown, M.D.; 1928. Privately Printed in Omaha, Nebraska. Demy 4to., pp. 270, with illustrations.

Diary for the Month.

MAR. 5.—Eye, Ear, Nose and Throat Section, South Australian Branch, B.M.A.
MAR. 5.—New South Wales Branch, B.M.A.: Ethics Committee.
MAR. 5.—New South Wales Branch, B.M.A.: Executive and Finance Committee.
MAR. 6.—Victorian Branch, B.M.A.: Branch.
MAR. 6.—Western Australian Branch, B.M.A.: Council.
MAR. 7.—South Australian Branch, B.M.A.: Council.
MAR. 8.—Queensland Branch, B.M.A.: Council.
MAR. 12.—New South Wales Branch, B.M.A.: Organization and Science Committee.
MAR. 12.—New South Wales Branch, B.M.A.: Medical Politics Committee.
MAR. 14.—Victorian Branch, B.M.A.: Council.
MAR. 14.—New South Wales Branch, B.M.A.: Meeting of the Section for the Study of Cancer.
MAR. 19.—New South Wales Branch, B.M.A.: Council.
MAR. 20.—Western Australian Branch, B.M.A.: Branch.
MAR. 21.—New South Wales Branch, B.M.A.: Branch.
MAR. 22.—Queensland Branch, B.M.A.: Council.
MAR. 26.—New South Wales Branch, B.M.A.: Council.
MAR. 27.—Victorian Branch, B.M.A.: Council.
MAR. 28.—South Australian Branch, B.M.A.: Branch.

Medical Appointments.

Dr. Benjamin George Johnston (B.M.A.) has been appointed an Honorary Medical Officer at the Port Pirie Hospital, South Australia.

* * *

Dr. Clive Rodney Boyce has been appointed Second Assistant Medical Superintendent, Hospital for the Insane, Goodna, Queensland.

* * *

Dr. Paul William Hopkins (B.M.A.) has been appointed Acting Government Medical Officer at Mackay, Acting Health Officer for the purposes of *The Health Acts*, 1900 *to* 1922, and Acting Visiting Surgeon to His Majesty's Gaol, Mackay, Queensland.

* * *

Dr. Noel Charles Kelleher Lane has been admitted to the Public Service, Queensland, and appointed Medical Officer, State Government Insurance Office, Brisbane.

* * *

Dr. Ethel Adelaide Orchard (B.M.A.) has been admitted to the Public Service, Queensland, and appointed Medical Officer, Department of Public Instruction.

Medical Appointments Vacant, etc.

For announcements of medical appointments vacant, assistants, *locum tenentes* sought, etc., see "Advertiser," page xviii.

DEPARTMENT OF INSPECTOR-GENERAL OF HOSPITALS: Four Junior Medical Graduates.

WOMEN'S HOSPITAL, CROWN STREET, SYDNEY: Junior Resident Medical Officer.

Medical Appointments: Important Notice.

MEDICAL practitioners are requested not to apply for any appointment referred to in the following table, without having first communicated with the Honorary Secretary of the Branch named in the first column, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

BRANCH.	APPOINTMENTS.
NEW SOUTH WALES: Honorary Secretary, 30 - 34, Elizabeth Street, Sydney.	Australian Natives' Association. Ashfield and District United Friendly Societies' Dispensary. Balmain United Friendly Societies' Dispensary. Friendly Society Lodges at Casino. Leichhardt and Petersham United Friendly Societies' Dispensary. Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney. North Sydney Friendly Societies' Dispensary Limited. People's Prudential Assurance Company, Limited. Phœnix Mutual Provident Society.
VICTORIAN: Honorary Secretary, Medical Society Hall, East Melbourne.	All Institutes or Medical Dispensaries. Australian Prudential Association Proprietary, Limited. Mutual National Provident Club. National Provident Association. Hospital or other appointments outside Victoria.
QUEENSLAND: Honorary Secretary, B.M.A. Building, Adelaide Street, Brisbane.	Members accepting appointments as medical officers of country hospitals in Queensland are advised to submit a copy of their agreement to the Council before signing. Brisbane United Friendly Society Institute. Stannary Hills Hospital.
SOUTH AUSTRALIAN: Secretary, 207, North Terrace, Adelaide.	All Contract Practice Appointments in South Australia. Booleroo Centre Medical Club.
WESTERN AUSTRALIAN: Honorary Secretary, 65, Saint George's Terrace, Perth.	All Contract Practice Appointments in Western Australia.
NEW ZEALAND (WELLINGTON DIVISION): Honorary Secretary, Wellington.	Friendly Society Lodges, Wellington, New Zealand.

Medical practitioners are requested not to apply for appointments to position at the Hobart General Hospital, Tasmania, without first having communicated with the Editor of THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, New South Wales.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

All communications should be addressed to "The Editor," THE MEDICAL JOURNAL OF AUSTRALIA, The Printing House, Seamer Street, Glebe, Sydney. (Telephones: MW 2651-2.)

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